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## ORIGINAL COMMUNICATIONS.

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### SPHENOIDAL SINUSITIS IN RELATION TO OPTIC NEURITIS.\*†

BY JOSEPH P. TUNIS, M. D., PHILADELPHIA.

As a proper understanding of the relation between inflammations of the optic nerve and sphenoidal sinusitis depends so fundamentally upon a thorough understanding of the intimate anatomical relations of these parts, I want first to consider briefly some anatomical peculiarities which have recently come to my notice before considering the pathology of this condition. These observations are based upon an examination of over 500 wet preparations. Those which presented points of special interest are shown in the accompanying drawings, (Figures 1 to 9). The greater the number of specimens examined the more the observer is impressed by the great variety in the extent and capacity of this sinus. This variation may be roughly estimated at from two to six centimeters, depending upon whether the sinus is of average capacity or whether it extends throughout the greater wings of the sphenoid. In three or four cases I have seen this sinus occupying every part of the greater wings as well as the body of the sphenoid, and not infrequently projecting backward into the occipital bone. As to the amount of tissue which intervenes between the mucous membrane of the sphenoidal sinus and the optic nerve, great variations are possible from less than one millimeter, as shown in Figure 2, up to one centimeter or even more, as shown in Figure 1. What holds

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†For permission to report these cases and for many privileges enjoyed during the study of the same the author is indebted to the courtesy of Professor Hofrat Weichselbaum and those associated with him.

good for the sphenoidal sinus in this relation is equally true of the posterior ethmoidal.

Several of the drawings already alluded to will show how intimate the relation between the posterior ethmoid and the sphenoid may be. In Figure 3, I have had a sinus drawn in which there was an extremely thin, posterior wall. This condition is not unusual and will, of course, predispose to brain complications where there is chronic inflammation of the sphenoidal mucous membrane. Figure 4 shows a drawing (actual size) of a very much elongated anterior nares with apparently two sphenoidal cavities, a probe having been introduced into each. The ostia of these two cavities communicated independently with the superior meatus. In Figure 7, we have an example of a subdivision of the sphenoid into two unequal compartments, the smaller of the two communicating with the larger anterior one. In Figure 9, I believe I have a unique specimen in which there is a tortuous communication between the superior meatus and the ostium which is thoroughly described in the legend of this figure. Such an anomalous condition would, of course, render the probing of such a sinus practically impossible. It would seem also that an anatomical peculiarity of this kind would certainly predispose to the retention of any pus which might form in this cavity. On the other hand, it may be taken as a good general rule that the larger the sinus the less danger there is of the retention of pus. Obviously, the reason for such a rule is that the larger the sinus, the larger the ostia.

As to the position and size of these openings there is the greatest variation. In my experience, the usual position is at the junction of the upper with the middle third of the anterior wall. In shape these openings or ostia incline to be oval or crescentic. Curiously enough, there is never more than one opening on each side. Figures 3 and 4 demonstrate certain practical points in the treatment of inflammatory conditions of the sinus under consideration. Figure 3 is a good example of how thin the posterior wall may be; thus exposing the subject of chronic sinusitis to the dangers of brain infection in addition to the usual dangers of cavernous sinus infection. Such an anatomical condition emphasizes the importance of instituting prompt remedial measures. In Figure 4, the unusually elongated nares would interfere with the application of the usual rule in the introduction of the measured sinus probe. The introduction of such a probe in the ordinary way across the middle of the middle turbinate would not bring the point in contact with the anterior wall of the sinus after the seven centimeter mark had passed the anterior nasal spine.

Also, in operating on such a case as is represented in Figure 7, it would be a comparatively easy matter to overlook this small posterior pocket which would probably share in the infection of the larger cavity.

As far as I can determine from a careful study of the anatomy of these parts during the last five years, I can find no peculiar distribution of lymphatic tissue between the sinuses and the optic nerve which would predispose to infection of one by inflammation of the other. In brief, it seems to me, that infection of the optic tract occurs from continuity and proximity rather than by extension through the lymphatics. That the relation between the optic nerve and the sphenoidal sinus may be an extremely intimate one is well shown in Figure 2. All of the drawings used for this article are from preparations made by the author, with the single exception of Figure 9, the drawing for which was made from a preparation now in the possession of Dr. Butt of Philadelphia. This preparation was made with the assistance of the author. The specimen from which Figure 1 was made is now in the Muetter Museum of the College of Physicians of Philadelphia, and is one of a series of frontal sections made recently by the author for that museum. The preparation was made from a woman, 28 years of age, who still retained, at the time of her death, a large mass of adenoid tissue in her posterior pharynx as well as enormous tonsils.

While much has been written by such well-known men as Zuckerkandl, Onodi, H. W. Loeb and others, much remains yet to be written before all the possible anatomical variations will have been described. What drew my attention particularly to this subject was the fact that in an examination of the sinuses of 100 heads in the autopsy-room of the Allgemeines Krankenhaus in Vienna, so many of the sinuses presented evidences of chronic inflammation to which little or no attention had been paid during the life of the subject.

The condition of the antra in this series of cases I have already reported. In this paper (*THE LARYNGOSCOPE*, October, 1910), it was shown that thirty-seven per cent presented some evidence of inflammation. Of these thirty-seven cases, eleven were examples of edema; twelve were examples of chronic inflammation or empyema; one was an alveolar or dental cyst and thirteen showed retention cysts, the latter being always associated with a low grade of inflammation.

While there was only one case in this series of 100 heads where the ethmoidal sinus was the seat of disease, and only two cases

where the frontal sinus was involved, all three were associated with inflammatory conditions of the maxillary antrum. On the contrary, in the nine cases which showed evidence of sphenoidal involvement, only three were associated with similar inflammation in the antrum. Of these nine cases of sphenoidal involvement, three were of a hemorrhagic character; three were examples of edema, and three of empyema.

*Case 1.* A man, 44 years old, a baker by occupation; very anemic subject, with the body muscular and well nourished. The diagnosis was leukemia. I have already reported this case as an example of multiple abscesses of the nasal submucosa. (*Am. Jour. Med. Sci.*, Jan., 1911). There was a well-marked hemorrhage in this sphenoidal sinus which was of large size, measuring  $4\frac{1}{4} \times 2\frac{3}{4}$  centimeters.

*Case 2.* A man, 77 years old, died of lobular pneumonia. He was only twelve hours in the hospital. At the autopsy I found considerable pus in both sphenoids. A culture was made of this pus and it was found to be rich in the diplococcus of pneumonia. Unfortunately, no part of the optic nerve was removed. An examination, however, of the sphenoidal mucous membrane only showed evidence of a recent submucous hemorrhage.

*Case 3.* A man, 47 years old, who died of progressive paralysis of luetic origin. At the autopsy all the sinuses were very large and the nasal mucous membranes a bright scarlet from congestion. There was a considerable hemorrhage in the right sphenoidal sinus, but no part of this mucous membrane was removed for examination.

*Case 4.* A woman, 21 years old, who died of phosphorus poisoning. The poison had been taken with suicidal intent. She had no frontal sinus. There was bloody edema of her small sphenoidal sinuses. I removed this mucous membrane in block for microscopic examination. The left sphenoid showed chiefly edema with scarcely any inflammatory change.

*Case 5.* A man, 51 years old, died of arterio-sclerosis and cirrhosis of the liver. This case appears as No. 21 in my antral series. Two days before his death this patient developed an attack of erysipelas which spread from the tip of his nose all over that organ and both sides of his face, in size and shape very much like a large butterfly. While the mucous membranes of the antra were decidedly affected, the membrane lining the sphenoidal showed only a little edema and the lining of the frontal sinus seemed to escape infection.



*Case 6.* A woman, 38 years old, who died of sepsis from an acute suppurative otitis media. This case I have also reported in my antral series as Case No. 22. The antral mucous membrane showed evidence of tubercular caseation. This was also distinctly seen in the ethmoidal region, while an examination of the sphenoidal mucous membrane showed only a low degree of infiltration of the connective tissue with goblet-cell formation. One of the most interesting features of this case was the length of time she was under observation,—nearly a year. Her first visit to the ear clinic occurred on March 25, 1909. On May 1, an operation was performed on the mastoid cells of the left side. Four days later this wound was extended along the sigmoid sinus. She died the following day. In October, 1908, six months before her first visit to the ear clinic, she had been under almost continuous observation, and yet, up to the time of her death, practically no attention was paid to her accessory sinuses.

*Case 7.* A woman, 70 years old, died of pneumonia. The duration of her last illness was one month. The sphenoidal sinus on the left side was half full of yellow pus. There was no pus in any of the other accessory sinuses.

*Case 8.* A man, 70 years old, died of arterio-sclerosis and gangrene of the foot. He had a very large sphenoidal sinus on the right side. The antero-posterior diameter of this was 4x3 centimeters, laterally. The sinus on this side extended backward to the occipital bone, where the posterior wall was extremely thin. There was pus only in the comparatively small, left sphenoidal cavity. I removed the mucous membrane of this left sphenoid and the optic nerve of that side for examination. The result was as follows: There was a subacute state of inflammation. The submucosa was thickened by an infiltration rich in new-formed blood vessels, giving a picture like granulation tissue. Between the infiltrating round cells there were numerous eosinophilic cells. The granular hematogenic pigment was either free or in the phagocytes. There were numerous plasma cells. The transverse and longitudinal sections of the optic nerve were negative.

*Case 9.* A woman, 37 years old, who died of tubercular meningitis. Autopsy showed tuberculosis of both lungs associated with caries of the eleventh vertebra. She was in the hospital only four days, and no eye-symptoms were recorded on account of her continued stupor. There was much stringy white pus in the right superior meatus. The posterior part of all the sphenoidal sinuses and the anterior part of the right sphenoid, together with the optic nerve were removed for examination.

Microscopically: The sphenoidal mucous membrane showed a great amount of goblet-cell formation. Longitudinal and transverse sections of the right optic nerve (see Figures 10, 11, 12) show an inflammatory condition, especially of the outerlayer, and an infiltration along the blood-vessels all through the nerve.

In connection with this series of nine cases there are two points of special interest: *First*, that six of them occurred independently without any evidence of associated inflammation with the adjacent sinuses; and, *second*, that out of the three cases where the sphenoidal sinusitis was a chronic condition, i. e., where there was actual pus present, I was fortunate enough to secure a microscopic examination of the optic nerve in two of them. In one of these cases the microscopic examination of the nerve was negative, while in the other it was positive (see Figures 10, 11 and 12).

#### LITERATURE.

It is beyond the scope of this present article to attempt a complete review of the literature of this subject even in the last ten years. Among many articles which have a particular bearing on this subject there are a few which I cannot refrain from referring to briefly. In 1905, and again in 1907, Dr. William Campbell Posey wrote of the "Ocular Symptoms of Affections of the Accessory Sinuses of the Nose." In 1907, Dr. F. R. Packard wrote of the "Ophthalmological Manifestations of Latent Diseases of the Nose and its Accessory Sinuses." All three of these articles contain many valuable points as to the diagnosis and treatment of sphenoidal sinusitis. The elaborate article of Dr. St. Clair Thomson deals particularly with the cerebral and ophthalmic complications. He cites forty-two cases, in all of which death ensued, either from meningitis, thrombosis, or intra-cerebral complications. Included in this series are two cases of his own which are minutely described. The articles of Birch-Hirschfeld and H. W. Loeb deal more particularly with the pathological anatomy of the subject. Both are rich in illustrations and bibliography.

One does not have to search far in the literature to find clinical reports of cases demonstrating every phase of the subject. Such cases have been reported by F. R. Packard, H. W. Loeb, Van der Hoeve and George E. de Schweinitz. Van der Hoeve reports three cases of disease of the optic nerve associated with post-nasal sinusitis. In one of these cases there was central scotoma for red and green fusing with the blind spot. In the other cases there was enlargement of the blind spot without central scotoma, and in one he reports retro-bulbar neuritis with retinal hemorrhages. Two

of these patients were relieved by operations on the nose, to which the third case refused to submit.

In this connection one of the cases reported by Dr. de Schweinitz is of especial interest. A young woman, after repeated visits to the oculist, and thorough examinations by her family physician, finally consulted a rhinologist. A small quantity of pus was withdrawn from the left sphenoidal sinus and was the first definite confirmation of the presence of deep-seated disease in this region. "Vigorous treatment, consisting of hot vapor baths, the administration of small, repeated doses of protiodid of mercury and suitable intra-nasal treatment, together with washing out of the sphenoid sinus at stated intervals was followed by a measure of relief and by a slight improvement in vision," etc.—"Ultimately, after a year's residence in Egypt and other warm climates, the patient returned apparently restored to health."

Dr. John F. Kulp, in 1910, reported among other cases one in which ocular symptoms caused by sphenoidal sinusitis were promptly relieved by removal of the anterior wall of that sinus and the establishment of proper drainage. Thus cases might be cited to almost any extent.

#### CONCLUSIONS.

1. Anatomically, the posterior ethmoid and the sphenoidal sinus must be regarded as having practically the same intimate relations with the optic nerve.
2. The larger the sinuses, the less the danger of infection from near-by inflammations.
3. Infection of the optic tract by the spreading of sphenoidal or posterior ethmoidal sinusitis is due more to continuity and proximity than to any peculiar arrangement of the lymphatic system in this region.
4. Sphenoidal or posterior ethmoidal sinusitis may occur independently and unassociated with ethmoiditis, or frontal sinusitis.
5. In a series of examinations of the accessory sinuses of 100 heads, tuberculosis was noted in the mucous membrane of only one case. This was of a diffuse and not very definite variety.
6. When the sphenoidal sinus is the seat of chronic inflammation the importance of a prompt diagnosis and the institution of equally prompt remedial measures cannot be too much emphasized.

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**The Control of Bleeding in Brain Operations.** JOSEPH R. EASTMAN. *Jour. of Ophthal. and Oto-Laryngol.*, June, 1912.

*Position:* Hemorrhage can be decreased notably by maintaining the head at such an elevation that the field of operation is higher than the trunk. *Elastic Constriction:* Of value in decreasing arterial bleeding but may increase venous hemorrhage. Where it renders the scalp blue with turgid veins its temporary removal or loosening may lessen the bleeding. An ordinary annular rubber-band, of the stationer's kind, is most convenient. *Gauze Pads Under Elastic Circlet:* A minor matter. *Flap Control:* The base of flap may be engaged between the jaws of rubber-covered forceps, lightly applied. *Diploe:* Usually requires no special attention. Horsley's wax or gum chicle may be pressed into openings. The latter must be removed before closing the wound. Tamping of the exposed ring of diploe with a punch instrument is valuable. *Wooden Pegs:* Pointed pine sticks driven into larger bleeding canals in the bone are useful, and can later be removed. *Hemostatic Sutures:* These may be applied completely around the area for flap incision, about one-third inch outside.

STEIN.

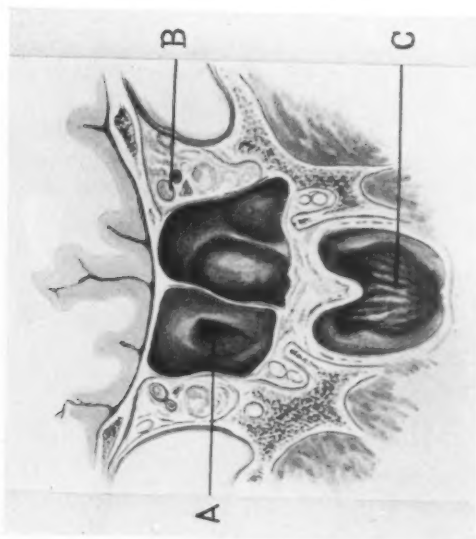


Figure 1. A sphenoidal sinus of average size with a posterior pocket on the right side and irregular septa. The relations of the optic nerves to this sinus are well shown. A. denotes the sinus; B. the optic nerve, and C. the adenoid tissue on the posterior wall of the pharynx.

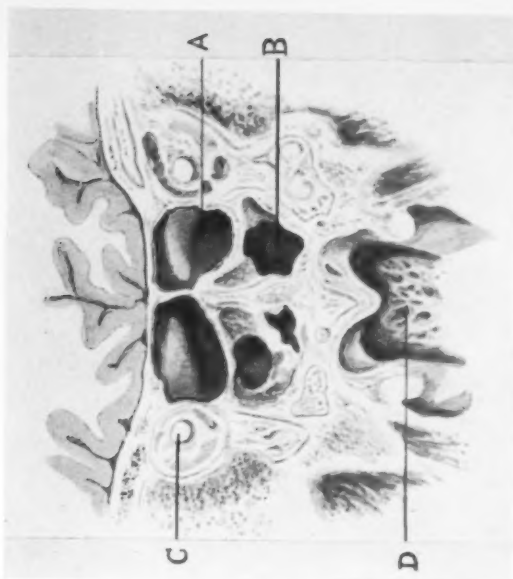


Figure 2. An unusually clear demonstration of the relation of the optic nerves to the posterior walls of the posterior ethmoidal sinuses. In this specimen the tissue intervening between the optic nerve and the overlying mucous membrane of this space was no thicker than the bony wall upon which this drawing was made. The sphenoidal sinus appears as three compartments underlying the ethmoidal and divided up by irregular septa. A. denotes the sphenoidal sinus; B. the posterior ethmoid; C. the optic nerve, and D. the posterior wall of the pharynx.

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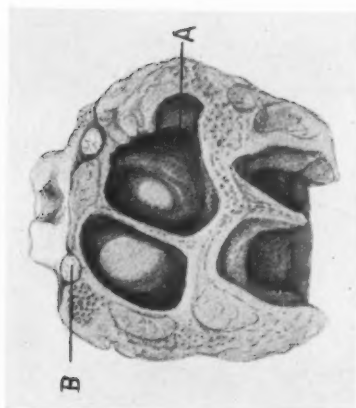


Figure 3. An average sized sphenoidal sinus with transparent posterior walls. On both sides the vertical measurement was  $3\frac{1}{4}$  cm. On the right the transverse diameter was 2 cm., and on the left  $1\frac{1}{4}$  cm. A. represents the sphenoidal sinus, and B. the optic nerve.

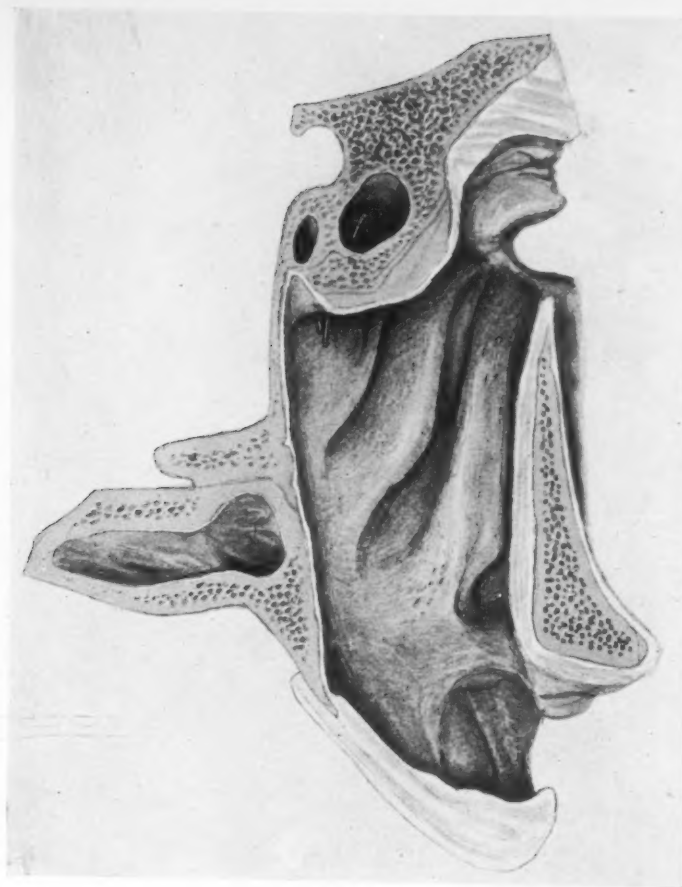


Figure 4. An unusually elongated nares with two sphenoidal sinuses opening by independent ostia into the superior meatus. This drawing is actual size. The ostia are shown by two small probes passing through them.

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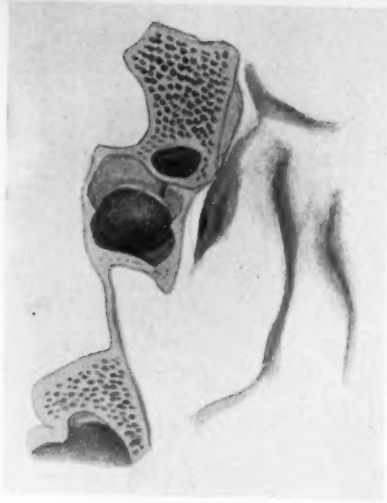


Figure 7. An unusual preparation showing the true sphenoid small with a large sphenoidal cell above it.

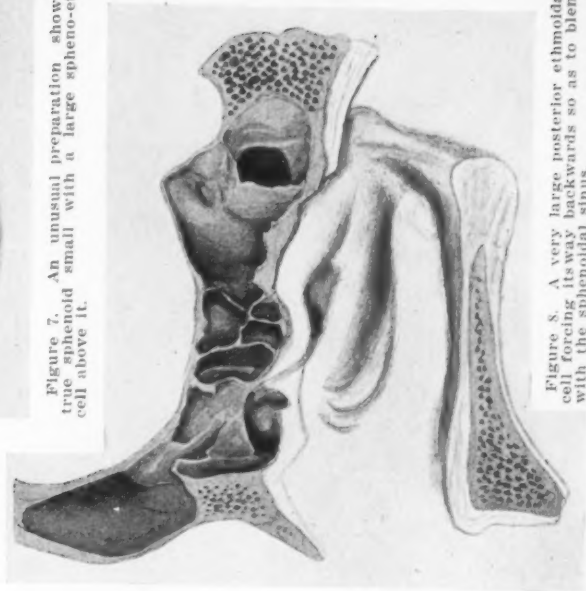


Figure 8. A very large posterior ethmoidal cell forcing its way backwards so as to blend with the sphenoidal sinus.



Figure 5. The right half of a preparation to demonstrate how a posterior ethmoidal cell may be pushed back into the sphenoidal sinus. The upper compartment is posterior ethmoid, the lower compartment is sphenoid.



Figure 6. The left half of the same preparation. In both the sphenoidal ostia are represented about the middle of the anterior wall.

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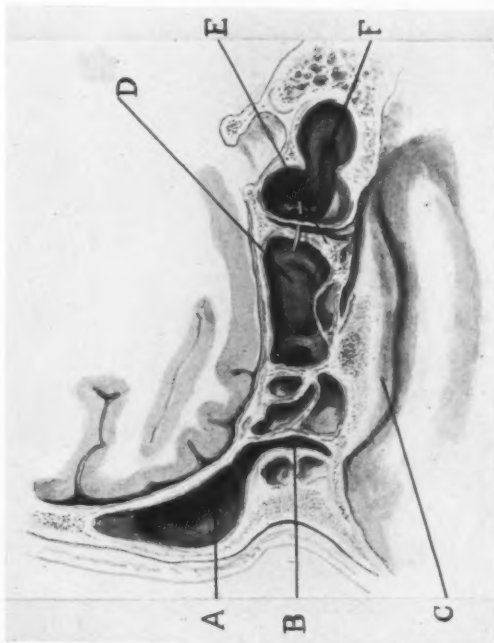


Figure 9. A very unusual position of the sphenoidal ostium (as indicated by a small probe) opening into a small canal in the partition (E) between the posterior ethmoid and the sphenoidal sinus. This canal was as represented about half an inch long running perpendicular to the superior meatus. A, indicates the frontal sinus; B, the infundibulum; C, the superior turbinate; D, the posterior ethmoid; E, the sphenoidal septum, and F, the sphenoidal sinus.



Figure 10. Longitudinal section of the optic nerve taken close to the periphery and including the sheath on one side. There is a moderate degree of edema, well marked vascular injection, and a profuse infiltration with small mononuclear cells in which there are a few poly-nuclear leucocytes.

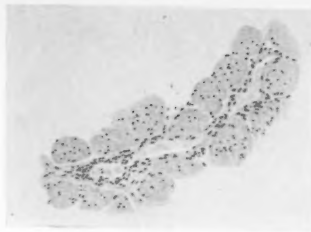


Figure 12. Section through the central blood-vessel of the nerve. There is a decided injection of the vessel and a slight infiltration of inflammatory elements in the same round-celled inflammatory elements.

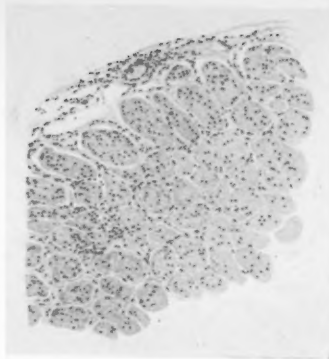


Figure 11. Transverse section of the remainder of the optic nerve, which shows much less inflammation of the sheath and of the interfascicular connective tissue. It shows however, a minor grade of the same process.

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**ARTIFICIALLY DEFORMED SKULLS WITH SPECIAL  
REFERENCE TO THE TEMPORAL BONE AND  
ITS TYMPANIC PORTION.\***

BY WALTER MC GIBBON, M. D., CHICAGO.

In the ascending scale of animal life there is probably no group of bones which has had more influence upon each other in their progressive changes than those comprising the brain case and the face. Because of their relationships to each other it becomes impossible when one is studying them during their post-natal development, to isolate a single bone and they have to be considered in their entirety. The purpose of this paper, however, is to direct attention to the irregular projections of bone in the external auditory canal found in a majority of those markedly deformed skulls of over 100 skulls examined. Though such projections have been mentioned and briefly described by many anthropologists as exostoses, further considerations would seem to indicate that they are not true exostotic growths, but are an abnormal development, or deformity, of the tympanic bone brought about by the artificial mechanical treatment to which such skulls have been subjected. The consistent deformity—and by that I mean a similar effect produced by a variety of pressures in varying subjects—of this bone indicates also the more far-reaching effect of pressure upon the skull upon both the brain and the bones of the face.

**HISTORICAL:** It is interesting to note how far back in antiquity cranial distortion was practised, evidences being seen earlier than the Iron Age. In fact, it is probably impossible to decide the earliest stage of human progress in which this practice was indulged, as some of the earliest skulls known show evidences of this treatment. Hippocrates first writes on this subject in describing the Macrocephales, a people who lived east of the Palus-Mocotis, from which custom it is said that they derived their name. Topinard says also that Heroditus described the same people and that Aristotle, Strabo and Pliny mention them. The two leading types which we find characterizing deformed skulls, dolichocephalic and brachycephalic—only the latter type is mentioned by writers as having been artificially deformed,—have been removed from the round and

\*Read at the meeting of the Chicago Laryngological and Otological Society, March 19, 1912.

long barrows of England and with them were buried implements contemporaneous with the Iron Age. There are also further indications of many of them belonging to the Neolithic and Bronze periods.

#### DISTRIBUTION.

The practice had a wide geographical distribution from Syria on the east, throughout Europe and Africa to America on the west. The Caucasus, Crimea, Hungary, Silesia, Belgium, France, England, both coasts of Africa, many islands on both sides of the world, South America, especially Peru, Mexico, and the United States, in the southwest and the Columbia River regions particularly, have given to the excavator many crania variously misshapen by artificial means. Whatever the cause or reasons for this interference with Nature's processes and whatever the disadvantages, it serves and has served a very useful purpose by augmenting historical data in identification of the derivation of peoples and races, and apropos of this consideration it may not be disadvantageous or uninteresting to quote from a man who has studied and written much on this subject; Topinard says: "We conclude, therefore, in comparing these data with those which history furnishes, that the Aryan nations with one of their tribes having this custom have passed over the Volskes-Tectosages of the Caucasus under the name of Cimmerii, through Europe into France, where the processes of disfigurement have become modified in the way we have mentioned.\*"

"Other skulls, however, have been met with in Europe as the Helvetio-Burgundian skull of Voiteur in the Jura, in the form of a sugar loaf; and perhaps that of Bel-Air, near Lausanne, in Switzerland, the nature of whose deformity is different, which leads us to believe that all European peoples disfiguring their heads have not had the same origin. Deformations of the skull have been discovered in Polynesia, especially, in Tahiti, in Malacca and in different parts of Asia as far as Syria.

"But the classic country in which these deformations are found is America. From a period prior to the Christian Era, we see a nation, the Nahuas leaving Florida, according to Brasseur de Bourbourg, to settle in Mexico, and quitting it in the year 1740 to disperse, some to the north along the Mississippi, other to the south, across the Isthmus of Panama, and there disseminating the custom of flattening the head from behind forwards. Other deformations of a different type are met with in the same country, which it seems reasonable to refer to another primitive people. From these devia-

(\*Note: Referring to three pathologic deformities of the skull which he calls Posthumous, Platybasic, and Plagiocephalic.)

tions from one and the same custom, we may infer that its origin dates back to a very remote period."

Neither sex escaped in this primitive procedure; an examination of a series of skulls, of both male and female, show the artificial deformities, but the number of female skulls is in the minority and these show less exaggerated moulding. This may not be due however, to the practice being more general upon the males, as the male skulls were greater in number in the groups examined.

The types of deformation at once divide themselves into two distinct classes, the long, narrow-headed or dolichocephalic and the short, broad-headed or brachy-cephalic. In the extremes of these two it is not possible to attribute any other cause than artificial mechanical compression, the conception present being to distort the permanent shape of the head to conform to either an idea of hideousness or beauty; or perhaps for the purpose of distinguishment or identification, since families, tribes and nations had different and distinctive head deformities. There are many modifications of these two extreme types; for example, the occiput alone may be flattened, or the flattening may be confined to the frontal region, or again the pressure may have been so distributed as to affect mainly the parietals. In many of these modified conditions there arises the question as to whether the malformation was accidental, for example, due to the manner of carrying the infant or to its lying upon a hard surface as the primitive crib with no soft head rest; or whether these conditions were preconceived and methodically elaborated; or again whether they may have been due to some pathological condition. Still another point arises in the consideration and discussion, and that is as to whether or not any degree of these modifications may have been congenitally transmitted. This question has been much discussed and is now answered almost, if not quite entirely, in the negative.

The question as to the earliest origin of this practice involves a consideration of the psychological state which has induced the popularity of such procedures, a question even more difficult to determine than the time at which this procedure was inaugurated, inasmuch as one is here dealing with an intellectual force which is played upon by the myths of the past, and which is profoundly affected by the consequent delusions. The aboriginal mind almost defies investigation in regard to the mental state which originally lead to this physical deformation. The determination of the reasons for this form of physical distortion must be largely influenced by personal opinion, based upon a consideration of the various rea-

sons given for these practices, together with a careful analytical survey of the ages of darkness which the primitive mind has traversed. Again the fact must not be lost to sight that this was not the only method of torture or distortion; many other parts of the body were subject to artificial treatment to produce departures from normal forms, but in the majority of these the soft structures mainly were involved and so skeletal indices are wanting. Of these customs, however, we have even so late recorded observation as given by Col. Theodore Roosevelt in his recent publication as follows: "One group of women, nearly nude, had their upper arms so tightly bound with masses of bronze and copper wire that their muscles were completely malformed. So tightly was the wire wrapped round the upper third of the upper arm that it was reduced to about one-half its normal size, and the muscles could only play, and that in a deformed fashion, below this unyielding metal bandage. Why the arms did not mortify it was hard to say, and their freedom of use was so hampered as to make it difficult to understand how men or women whose whole lives are passed in one or another form of manual labor could inflict upon themselves such crippling and painless punishment."

The mental state acting as the forerunner of these procedures, however, is not referred to, and it is accepted that it is done for purposes of personal adornment or as features of distinguishment. So also O. W. Barrett in a recent article speaking of the personal decorations of the Morzambique women, says: "This scar tattooing is practiced very largely by the M'Chopis, and is imitated to some extent by their neighbors. However, the lower tribes do not usually make so large nor so thick a bosse as the M'Chopi women. The M'Chopi tattooers use one or more native resins to rub into the fresh surface of the cut to stimulate the growth of scar tissue. Consecutive semi-circular cuts are preferred. The bosse or point in the center of the scar mass is sometimes one-half an inch thick. There seems to be little design among the M'Chopi tribe in the arrangement of these scars, which extend from a line just below the breasts to just above the knees."

So late as 1585 in ancient Peru before the Spanish Conquest an edict of ecclesiastical authorities against head deformation (mentioning three distinct forms) was issued and again a government edict against it was published as late as 1752. Flower, in "Essays on Museums," after discussing the original people of whom so many deformed skulls have been found in Europe and inclining with the later French authors in assigning them to the Aryan race, remarks:

"Whether the French habit, scarcely yet extinct, of tightly bandaging the heads of infants, is derived from these people, or is of independent origin, it is impossible to say." Further he says: "But the Chinook Indians of the neighborhood of the Columbia river, and the natives of Vancouver Island, continue it to the present day" (1898). Thus it may be seen that primitive peoples have practiced and do practice varied forms of distortion of various parts of the body even in our own time and the state of mind which induced it is just as far from the understanding of the so-called superior races as it ever was. It is, however, recognized generally that in all stages of development the human family has been and still is strongly subject to influences of superstitions and myths and their actions controlled to a greater or less extent thereby. So whatever reasons it may be possible to add to this general statement it is quite probable that the then conceived religious ideas, at least, were a strong factor in the causation of these practices. And this is shown in the following observation by M. Coragua: "When our children are young, said the chiefs to the Friar Bobadilla, their heads are tender and are then moulded into the shape which you see in us by means of two pieces of wood hollowed in the middle. *Our gods instructed our ancestors* that, by so doing, we should have a noble air, and the head to be better fitted to bear burdens." In addition to this the reasons for cranial malformation are various, for instance, Torquemada states that in Mexico the Indians used to deform their heads to appear more formidable. Spencer affirms that permission to shape the heads of their children was a favor granted by the Inca to some nobles—the artificial contours being that of the royal family. While the Coragues and Collas of Peru say that they form their heads into these shapes (long and broad, but flattened behind) that they may be more healthy and be able to do more work. And yet another nation follows out this custom to increase the ferocity of their expression. Santa Cruz says: "Maneo Coapac ordered the heads of infants to be pressed, that they might grow up foolish and without energy; for he thought that Indians with large round heads being audacious in any enterprise, might also be disobedient."

The method of producing these deformities, of course, varied according to the particular type of skull formation it was desired to obtain. In this consideration those apparently accidental cases which were brought about by the infants being strapped to the board for carriage, or those induced accidentally in other ways may be excluded. As it is only those extreme types of malformation, where force and counterforce have been employed, that show marked

disturbance or deformation of the tympanic bone; so the methods of production of only those types will be here considered.

As above indicated, these types are two in number and diametrically opposed in form, except in one very important particular, and that is the condition and relations of the lower or basilar part of the skull. In both the brachycephalic and dolichocephalic type, whether extreme or only slightly affected, the basi-cranial relations are similar in their manner and degree of departure from normal. Discussion of these deviations is reserved until later, but the fact of the two types being similar in this respect can be shown by an understanding of the methods producing them. This fact on only a cursory thought is contrary to supposition, as the one type is the broadest and shortest known skull, while the other is the longest and narrowest known skull, these measurements having to do, however, only with the calvarium. A quotation from Landa made by Spencer describing the method of procedure for producing the brachycephalic deformation will give a general idea of the mechanical contrivances in all similar cases: "Four or five days after birth, the child was put on a small bed made of rods, and there, the face being underneath, the head was put between two boards, one being at the occiput and the other at the front. Between these they compressed it forcibly, and kept it there for some days, until the head was flattened and shaped like their own." This was the general way in which this form of deformation was accomplished, but there were, of course, variations in applying this pressure. The point being that the pressure was applied anteriorly over the frontal bone (which in infant life is composed of two bones, the suture extending between them to the nasal bones) and posteriorly over the occiput so that the pressure was exerted anterior and posterior, respectively, upon a plane passing from the glabella to the occipital point, this plane approximating the basi-cranium and including the parts of the temporal bone.

The method employed for producing the dolichocephalic or sugar loaf head was to bandage the cranium from the occipital point around posterior to the auricle over the superior part of the mastoid, to the frontal region and back on the opposite side in a similar manner to the occipital point. This bandage covered the frontal bone from the glabella up over the frontal eminences, where apparently a space was left, and then the bandage again applied just posterior to the coronal suture, so that in many skulls, at least, a laterally extending elevation occurs between these two points. It is evident in these cases as in the artificial brachycephalic type that the



inferior area receiving pressure approximates the antero-posterior plane of the cranial base. But from the position of these compressions the skull is permitted to expand upward and posterior developing along the lamboidal and allied sutures. Again this skull differs in form from the artificial brachycephalic as the technic of this procedure limits or compresses the median lateral diameter, therefore, resulting in the marked narrowing of the skull; the lateral compression and that over the frontal and infra-occipital regions permit development only from the sagittal and lamboidal sutures. So that while the manifest external results of these two types are diametrically opposed it is only the cranial vault or calvarium which is affected in an opposite manner and the cranial basilar structures suffer in each instance in a similar way.

It was the original intention of the writer to describe and demonstrate malformed tympanic bones which occur in many artificially deformed skulls of the brachycephalic type, which were observed while studying other mechanical effects in development. While making additional observations upon artificially dolichocephalic skulls, in order to show the supposed opposite or dissimilar conditions in the tympanic bone from those in the brachycephalic skulls it was found that they showed as consistently a similar but less amount of pressure upon certain parts of the petro-mastoid, squamo-zygomatic and upon the tympanic bones causing in a less pronounced degree similar malformation of the latter bone to that found in the artificial brachycephalic skulls and a marked change in form and development of the petro-mastoid and squamo-zygomatic parts of the temporal bone. The above notation of facts introduces the truism voiced by the distinguished anthropologist Dr. Geo. A. Dorsey, that, "In artificially deformed skulls every part is deformed," rendering it impossible to consider individually in its growth any separate bone of an artificially deformed skull, the same as is true in an unrestrictedly growing skull. It was made necessary therefore to include with the malformed tympanic bone, in form and relations of the other components of the temporal bone changes in form and relations of the other components of the temporal bone found in the two opposite representatives of deformed skulls.

A marked difference is noted in the two types of deformation at the temporal part of the lateral antero-posterior suture. In the brachycephalic skulls there is closer approximation of the suture between the squamo-temporal and the articulating bones than in the normal, the parietals causing a bulging outward of the temporals.

In the dolichocephalic skulls, on the contrary, there is marked widening of the sutures in this locality, in many instances the parietal bones being considerably drawn away from the squamo-temporal and an indenture following along the suture well to the sagittal side of it. Notwithstanding, however, the diametrical differences in shape of these two types of skulls, owing to the fact that the temporal bone unites the anterior and posterior segments of the base of the skull, the methods practiced in producing the deformities involve the temporal bone in a similar manner in both instances, especially affecting its outer and containing the external auditory meatus, formed in the main by the tympanic bone. The effects produced are of the same kind, differing only in degrees. The exact location of pressure varied but the external auditory meatus with its tympanic bone being in the direct line of fixation or compression, as a consequence was found to be malformed in both types in a similar manner, but less markedly in one than in the other.

Other parts of the temporal bone receiving pressure in a different manner and direction or being allowed freedom and complementary developments in other directions, vary according to the differences incidental to the type of compression exerted. These variations between the two types will be noted in the individual reports of the specimens examined which are appended, but there are some which are sufficiently interesting and possibly instructive in their bearing upon the development of the skull to warrant special consideration.

In all examined skulls artificially shortened, the relations of the squamo-zygomatic bone to the parietal posteriorly and to the ali-sphenoid anteriorly are changed, the sutures being much more closely approximated and the antero-posterior axis of the squamo-zygomatic relatively shortened. The foramina between the petrous-temporal and articulating bones are strongly contracted and this fact together with the almost total obliteration of the sutural crevices between the petrous bone and the basi-occipital posteriorly and the basi-occipital, basi and ali-sphenoid anteriorly give the petro-temporal the appearance of having been driven like a wedge into an almost solid structure. In many skulls in which the tympanic bone is not affected, there is a downward development of the mastoid portion of the bone, a large mastoid cell area, and this carries with it the tympanic bone, so that the meatus is not materially altered.

In the skulls artificially elongated, while not so many were examined, yet there was consistently shown marked upward curving of the linea temporalis toward the lambda, increased antero-poster-

ior diameter of the base of the mastoid portion of the temporal, posteriorly extending to the occipital by a broad tongue-like extension of bone similar to that occurring at times in the temporal fossa and articulating the squamo-zygomatic with the frontal bone. In the former instances the masto-occipital suture in each case becomes exceedingly complex and often contains an intercalary bone. This may be a development simulating formation of intercalary bones in sutures where nature finds it necessary to increase the capacity of the skull. In these specific instances of deformation where the brain is forced to develop postero-superiorly and demands room for growth above, the bony space in the skull must be increased; and so the development of the tongue-like process of the mastoid to fill in this space. This provision of nature has its analogue, or vice versa, in the before-mentioned tongue-like development of the frontal fossa; the developing frontal lobe causing a pushing forward and widening of the anterior angular form of the superior and inferior leaves of the bone as found in the lower species, into a well rounded curve presenting the frontal eminences; the tongue-like processes of bone from the temporal push forward and fill in the space. Of course these are only isolated cases in the frontal example, but they show the manner in case of need; and the cause back of the need in these developments requires further elucidation.

Many specimens of dolichocephalic skulls showed dehiscence in the glenoid fossae opening into the inner end of the external auditory canal, and the glenoid fossae were in many instances widened antero-posteriorly. In such cases the Glasserian fissure is particularly wide and it will be noticed that in two of these specimens this widened fissure also contained long oval intercalary bones (which may be identified with that part of Meckel's cartilage having to do with the preformation of a portion of the malleus).

It would be interesting to note the upward curved linea temporalis in relation to the cerebral fossa in these cases and also to ascertain the significance of these intercalary bones—occurring in the two positions—in this type of skull, as they occur in that form of the Inca skulls, giving rise to the much disputed "os Encae," or epactal bones." (Dr. W. Matthews: *Am. Anthropol.* p. 338).

The most noticeable changes, however, occur in the tympanic portion of the temporal bone. In nearly every skull in which the shortening of the antero-posterior basilar diameter is at all marked, the tympanic bones are either irregular in form showing nodular formations presenting into the external auditory canal, flattened

antero-posteriorly, the long axis of the meatus more nearly perpendicular than normal, or the orifice, if regular, is very strongly contracted owing to the material thickening of the bone itself and a shortening of the Ravinian fissure.

This characteristic of many of the aboriginal skulls has been noted and mentioned in writings by many investigators, but has always been termed exostoses of the external auditory canals and been ascribed to a peculiar obliquity in development in these people. William Turner writes in 1878, in the *Journal of Anatomy and Physiology*, that in 1864, Professor Seligman directed attention to the presence of exostoses in the external auditory canals of some specimens of American crania which *had undergone artificial elongation*. He further says through a number of years and though many crania have passed through his hands, both European and exotic, he has not seen one with exostoses in the external auditory canals until recently, and that skull was from Pisagua, Peru, and was markedly antero-posteriorly deformed. He describes minutely the abnormalities and compares them with Davis' in *Thesaurus Craniorum*. After stating, however, that the only exostoses, which he ever saw occurred in artificially deformed skulls, yet he does not think that the deformation of the skull was the cause but, "there would thus appear to be a tendency on the part of the aboriginal inhabitants of the American continent to possess modifications in the configuration of the external auditory passage."

It is true that many of the skulls of aborigenes do not show any noticeable changes in the temporal bone, even those which show an attempt at artificial deformation, but this is easily explained by the inaccuracy of the methods used and the displacement of the mechanical devices—particularly those for antero-posterior shortenings—too early removal of the devices, which were kept in position any length of time from a few weeks to the end of the first year, and again upon the particular type of bones in the individual. Those having hard diploetic skull-bones showed the most marked deformities of the temporals, while often those having the more pneumatic type of bones evinced no unusual formation of the temporal bones even though there might be marked cranial vault deformity. But again this latter class of skulls does not show such strongly marked encroachment of the basilar structures upon each other as are to be found in the former type of skulls, and in the former type the suture lines were, in proportion to age, in the two types found to be more advanced in the process of ossification. Another fact to be noted in this connection is that in the type of skull shortened antero-

posteriorly the pressure often became displaced so that one side was much more strongly contracted than the other, and in these specimens the tympanic bone, particularly, often was markedly malformed on one side, that being the side upon which the greater pressure was exerted, and presented the characteristic nodular form the so-called exostoses of the canals.

The shortening of the basi-cranial antero-posterior axis was brought about in the cranially deformed individual mostly, if not entirely (so far as gross manifestations indicated) by the contraction to a greater or less extent of the foramen lacerum medius and the foramen lacerum posterior and the forcible impingment of the sphenoid and occipital bones respectively upon the anterior and posterior margins of the petrous portion of the temporal bone.

In many instances the above foramina, normally wide, slit-like openings were reduced to the smallest possible dimensions. The basi-cranium of those subjects which present the most pronounced results of these types of compression appear like a solid mass of irregular bone, instead of being made up of several separate and distinct bones joined by sutures.

Fronto-occipital pressure in the developing skull results in the inability of the skull to expand either upward and forward or downward and backward, in consequence of which the brain growing and expanding, the pressure must be equalized in directions upward and backward and, diametrically, downward and forward. A question arises here as to whether the pressure is exerted by and through the brain *per se* or is entirely transmitted by the separate and different bones through their sutural margins, the high probability being that it is transmitted in both ways. The parietal bones held between the vice-like compression of the frontal at the coronal suture anteriorly and the occipital at the lambdoidal suture posteriorly, becomes shortened along the base-line of the arc by the approach of the coronal toward the lambdoidal suture and so they form a higher and more precipitate arch as they develop either at the parietal eminences, or at the crown along the sagittal suture if the influencing pressure is exerted sufficiently from the lateral aspects to also shorten and heighten the arch laterally.

As the complemental expansion occurs upward and backward a diametric pressure is exerted downward and forward by means of the parietal bones transmitting the effects of the pressure along the lateral antero-posterior suture to the petro-mastoid at the junction of the lateral antero-posterior suture with the lambdoidal and the squamo-temporal respectively, insinuating the former (petro-mas-

toid) inward and forward toward the basilar axis and also impinging the posterior half of the tympanic bone, driving it forward to be caught and repressed anteriorly by the squamo-temporal, which is also by the same process pushed downward involving in the compression the anterior segment of the tympanic bone so that it can develop unrestrictedly in neither direction, anterior and upward nor posterior and upward, but must follow the line of least resistance and curl from either extremity inward upon its axis. This narrowing of the space of the normal development of the tympanic bone is also further increased by the direct transmission of pressure from the orbito-frontal plate through the greater wing of the sphenoid and thence to the squamo-temporal anteriorly, pressure being thus propelled directly against the anterior segment of the temporal bone.

These processes are further increased by the fact of the squamosal ossifying at the earliest stage—just after birth—in the direction upward, outward and forward, and therefore encroaching in those directions from which pressure is already being made in the very impressionable skull, and also ossifying outward involving at once its tympanic division which at the time of birth has become attached to it at its two terminals, anterior and posterior.

The interesting observation as to the effect of the compression upon the internal auditory meatus located immediately above the jugular foramen was rendered impossible owing to the presence *in situ* of the calvaria.

1. Ancon, Peru—Brachycephalic, not extreme, auditory canals normal.
2. Ancon, Peru—Brachycephalic, extreme, auditory canals normal.
3. Not located—Brachycephalic, not marked, auditory canals normal.
4. Not located—Brachycephalic, not marked, auditory canals normal.
5. South Sani—Brachycephalic, not marked, auditory canals normal.
6. Not located—Brachycephalic, not marked, auditory canals normal.
7. Ancon, Peru—Brachycephalic, not marked, auditory canals normal.
8. Not located—Brachycephalic, parietals not prominent; auditory canals normal.
9. } Children's skulls—not deformed, auditory canals normal.
10. }
11. }
12. Ancon, Peru—Brachycephalic, short basilar index. Exostoses in each auditory canal, but larger in one than in other, making auditory canals into an S-like slit. (40074). Case 2.
13. Ancon, Peru—Flat frontal, but occiput normal, and auditory canals large, round and funnel-shaped.
14. Ancon, Peru—Slightly brachycephalic, no exostoses, but auditory canals narrowed symmetrically in antero-posterior direction and the long diameter nearer perpendicular than normal.
15. Ancon, Peru—Brachycephalic, auditory canals clear but antero-posterior diameter shortened, not extremely.
16. Not located—(Male) markedly brachycephalic, auditory canals narrowed on either side to slit-like orifices, perpendicular diameter.



17. Ancon, Peru—Not brachycephalic, auditory canals normal.
18. Ancon, Peru—Brachycephalic, bones more pervious than in previous brachycephalic skulls examined, and with this condition nasal and facial bones are developed in long supero-inferior axis, giving a long index from anterior margin of foramen magnum to superior alveolar process; mastoid large and much elongated. Auditory canals narrowed antero-posteriorly; long diameter, more nearly perpendicular and lengthened.
19. Ancon, Peru—Not brachycephalic, auditory canals normal.
20. Negro—Not brachycephalic, auditory canals large, round and funnel-shaped.
21. Ancon, Peru—Brachycephalic, auditory canals very small. In the right one the antero-posterior diameter is shortened, but in the left one is rounded.
22. European—Not brachycephalic, auditory canals large and oval.
23. Not located—Idiot. Brachycephalic (not artificial), with high frontal and parietals. Auditory canals normal except long diameter nearly horizontal.
24. Ancon, Peru—Not brachycephalic, auditory canals normal with long diameter nearly vertical.
25. Chinook, Columbia River—Child, not deformed, auditory canals normal.
26. Ancon, Peru—Brachycephalic and asymmetrical, greatest compression over right frontal, so that left frontal and left parietal are higher than right ones. Auditory canals have long diameter nearly vertical with bony hypertrophy extending into canals from posterior margin of tympanic bone.
27. Ancon, Peru—Brachycephalic, auditory canals very small and round, the tympanic bones curled around instead of forming exostotic enlargements.
28. Ancon, Peru—Brachycephalic, auditory canals narrowed by thickening bone, antero-posterior and long diameter is vertical.
29. Sierra Gorda, Peru—Dolichocephalic, auditory canals normal but long diameter practically vertical.
30. Ancon, Peru—Slightly brachycephalic, auditory canals normal but long diameter practically vertical.
31. Ancon, Peru—Not brachycephalic; auditory canals; the right has small exostoses, anterior and posterior; the left has large, posterior exostoses and a small one anterior and above.
32. Ancon, Peru—Brachycephalic, auditory canals; right, small, antero-posterior diameter much shortened by general thickening of tympanic bone and long diameter vertical. Left, slit-like form, an encroaching enlargement of posterior upper end of tympanic bone.
33. Ancon, Peru (probably)—Brachycephalic, auditory canals clear but long diameter approaches a more horizontal position than normal.
34. Comox—Metacephalic—Auditory canals normal, very large; long diameter nearly vertical.
35. Not located—Brachycephalic, but not apparently artificially compressed; auditory canals small, oval, with long diameter vertical.
36. Ancon, Peru—Brachycephalic, auditory canals are coffee bean shape; left one having depression posterior and right one reversed. Long axis vertical.
37. Ancon, Peru—Brachycephalic, auditory canals narrowed antero-posteriorly, thickening of tympanic bone and long diameter vertical.
38. Not located—Dolichocephalic, auditory canals large and of normal shape.
39. Not located—Metacephalic, but with very flat, sloping frontal bone and prominent occiput; auditory canals large and round, becoming funnel-shaped as they progress mesiad.
40. North Caledonian—Dolichocephalic, marked prognathism; auditory canals round and funnel-shaped.

41. Ancon, Peru—Brachycephalic. Auditory canals normal except that long axis is more nearly vertical than normal.
42. New Guinea—Dolichocephalic, auditory canals large, oval, with long diameter nearly vertical.
43. Not located—Dolichocephalic, auditory canals large and oval, with long diameter upward and forward, downward and backward.
44. Corvitchin Wharf—Antero-posterior compressed apparently artificially and asymmetrically, the compression being from one side anterior with opposite side posterior. Auditory canals very small and contracted, longer diameter being horizontal rather than vertical.
45. Not located—Brachycephalic, frontal much flattened; auditory canals very small, almost round, but with slightly longer diameter in a vertical position.
46. South Sanitch—Brachycephalic, flat frontal asymmetrical with high, bulging parietals, auditory canals much smaller than normal, the left being smaller than the right, but the form oval, and the long diameter normally placed.
47. "Booboo Moban"—Metacephalic. Auditory canals large and almost perfectly round.
48. Ancon, Peru—Metacephalic, no antero-posterior flattening; auditory canals normal.
49. Not located—Metacephalic, auditory canals normal.
50. Ancon, Peru—Metacephalic, frontal not flattened, auditory canals normal.
51. Not located—Metacephalic, with receding frontal and prominent occiput (cannot determine whether or not artificially flattened), auditory canals normal.
52. Ancon, Peru—Brachycephalic, flattened frontal and prominent parietals, auditory canals abnormally small and long diameter vertical.
53. South Sanitch—Metacephalic. Auditory canals small and coffee bean shaped, longer diameter forward and upward, downward and backward.
54. Ancon, Peru—Metacephalic, auditory canals small, long diameter vertical, left canal bony projection in lower posterior quadrant, and right has bony projection in upper anterior quadrant.
55. Not located—Dolichocephalic. Auditory canals small, nearly round, but slightly longer diameter vertical.
56. Negro—Dolichocephalic. Auditory canals free from projections, funnel-shaped, (growing smaller in diameter mediad), but externally having slightly longer diameter upward and forward, downward and backward.
57. Ancon, Peru—Metacephalic, auditory canals large, free, and oval with long diameter almost vertical.
58. "European"—Metacephalic, auditory canals medium large, oval, long diameter upward and forward, downward and backward.
59. Hottentot—Dolichocephalic—Auditory canals large and very nearly round, but having slightly longer diameter upward and forward, downward and backward.
60. Songish (Indian)—Brachycephalic, auditory canals very small but free and oval with long diameter upward and forward, downward and backward.
61. Peruvian—Metacephalic, auditory canals small, but normal in shape.
62. "European"—Not deformed, auditory canals large, oval, long diameter upward and forward, downward and backward.
63. "European"—Metacephalic, auditory canals normal.
64. Ancon, Peru—Metacephalic, auditory canals very small, but otherwise regular in form.
65. Ancon, Peru—Antero-posterior artificial compression but asymmetrically, being from right downward to left posteriorly. Auditory canals unequal, the right one being larger and oval, with long diameter upward and forward, downward and backward, this side having occiput

- larger, fuller, and lower level of parietal eminence, the left canal is small and nearly round, but no projection, the occiput being very compressed and the parietal eminence high.
66. Ancón, Peru—Brachycephalic, auditory canals have no bony projections but are flattened in general antero-posteriorly, but still have longer diameter extending in direction upward and forward, downward and backward.
  67. Laplander—Metacephalic, auditory canals: left, very large and appears as if dilated (scooped out), but is oval with long diameter upward and forward, downward and backward; right canal normal.
  68. Not located—Dolichocephalic, only one auditory canal present (other broken away) which is contracted antero-posteriorly and has small bony projection on posterior upper outer margin of tympanic bone.
  69. Not located—Metacephalic. Canals normal.
  70. Not located—Dolichocephalic. Canals large and normal in form.
  71. Not located—Brachycephalic. Short antero-posterior diameter, but canals normal.
  72. Not located—Dolichocephalic. Canals large and regular in form.
  73. Not located—Metacephalic. Auditory canals large, long diameter far forward as it extends upward and forward, downward and backward.
  74. Ancón, Peru—(Child)—Canals normal.
  75. Not located—Metacephalic. Auditory canals normal except the long diameter is nearly vertical.
  76. Not located—(Child). Metacephalic, auditory canals large and free from excrescences. Auditory canal, each side dehiscence posterior at inner margin of glenoid fossa, anterior to fossa of bulbus jugularis and external to carotid canal.
  77. Not located—Brachycephalic. Antero-posterior compression asymmetrical, being more marked on left frontal with right occiput. Auditory canals: nothing remains of either but slits, owing to large, bony projections from posterior upper edge of tympanic bones which curl into canals, giving each a nearly semi-circular form.
  78. European—Metacephalic, frontal bone not compressed; auditory canals free, large and oval, long diameter upward and forward, downward and backward.
  79. South Sanitch—Brachycephalic, left frontal more compressed than right, and high left parietal with compressed right parietal; auditory canals small and nearly round, but the slightly longer diameter, almost transverse.
  80. American—Brachycephalic. Auditory canals free and as usually found, except longer diameter is slightly more vertical.
  81. Papuan—Metacephalic. Auditory canals normal.
  82. South Sanitch—Brachycephalic. Antero-posterior compression asymmetrical, being greater from left frontal with right occiput; auditory canals small and nearly round, with the slightly longer diameter vertical.
  83. Bushman—Dolichocephalic, auditory canals larger than normal and more nearly round.
  84. Ancón, Peru—Child. Metacephalic, auditory canals normal.
  85. Ancón, Peru—Metacephalic, auditory canals; left has small excrescence at antero-upper margin of tympanic bone and a larger one at posterior-upper margin of tympanic bone. Right canal is regular in form but narrower antero-posteriorly than normal.
  86. South Sanitch—Brachycephalic auditory canals regular but smaller than normal.
  87. Not located—Brachycephalic, auditory canals are narrow slits caused by curling up of tympanic bones but only small bony excrescences in the canal anterior and posterior.
  88. Kwakiutl—Dolichocephalic, auditory canals small, oval, with antero-posterior diameter shortened and long diameter nearly vertical.

89. Ancon, Peru—Brachycephalic. Auditory canals small, contracted antero-posteriorly and right has large, bony excrescence at upper posterior edge of tympanic bone.
90. Ancon, Peru—Metacephalic, auditory canals small, but regular in form.
91. South Sanitch—Brachycephalic, auditory canals antero-posteriorly narrower than normal but regular in form.
92. Chancay, Peru—Metacephalic. Auditory canals smaller than normal, the long diameter being nearly vertical, the canal walls are smooth and regular but diameter is made smaller by thickening upward and inward of the anterior edge of tympanic bone.
93. Chancay, Peru—Brachycephalic. Auditory canals small, with slight thickening of the anterior edge of tympanic bone which, had the subject become older, would in all probability have developed into a bony excrescence.
94. Not located—Brachycephalic, auditory canals round and funnel-shaped.
95. Chancay, Peru—Brachycephalic, auditory canals small but regular.
96. Not located—Metacephalic, auditory canals small but regular.
97. Not located—Brachycephalic, auditory canals; right one narrow and slit-like with long diameter nearly vertical and a small excrescence at the posterior upper margin of tympanic bone and a pronounced general thickening of the anterior upper margin of the bone. Left canal entirely closed with exostotic growths, the posterior larger and curled over anteriorly into the lower part of the canal and above it and curling posteriorly, the thinner curled hypertrophic growth of the anterior margin of the tympanic bone.
98. Not located—Metacephalic, showing evidence of artificial deformation. Auditory canals; left narrowed to an irregular slit, with axis vertical. This closure is caused by a regular thickening and the formation posteriorly of two unequally thickened plaques. Right canal is altered only in having the long diameter nearly vertical. (On the left side this skull has a paramastoid process and shows slight dehiscence of bone posterior to and mesiad from the temporo-maxillary articulation).
99. Mound builder—Metacephalic, not artificially deformed; bones light in texture, auditory canals large, round, externally and contracting mesiad to become funnel-shape.
100. Ancon, Peru—Brachycephalic, auditory canals regular in form but very small, the tympanic bone being consistently thickened.

#### SKULLS FROM CULIN, VANCOUVER ISLAND.\*

1. Dolichocephalic; artificial; coronal suture bandaging; tympanic bones thin; right canal larger than left; right canal long diameter perpendicular; left canal long diameter slightly upward and forward, downward and backward. Canals larger than in European skulls.
2. Kwakiutl (40785), British Columbia—Dolichocephalic; frontal pressure; bones are small and slight; tympanic bones thin and do not extend up well posteriorly onto the mastoid portion. Canals small but regular, with long diameters extending slightly in direction upward and forward.
3. Salmon River (40799)—5-year-old child—Dolichocephalic, but apparently not artificial. Tympanic bones the same as in (40785) as to thinness and position. Canals large, oval and long axis upward and forward. Glenoid fossae both very large, broad antero-posteriorly and dehiscence of the tympanic bones leading from the external auditory canal into the inner and posterior part of the articular area. Glaserian fissure very marked on both sides.

\*Note: Parenthetical numbers refer to case and individual specimens in the Field Museum of Natural History.

4. Stone Graves, etc., British Columbia (40772)—Very thick diploetic type of bones. Dolichocephalic; flattened frontal. Tympanic bones thick but short in upward direction on posterior aspect. Right canal oval with long diameter perpendicular. Left canal round.
5. Krooste head (41519) (182)—Heavy, thick bones; massive face. Dolichocephalic, but not markedly, and not artificially deformed; exceedingly long styloid bones and heavy; tympanic bones thick and heavy with large vaginal processes. Canals large and oval, slightly antero-posteriorly shortened on right side and long diameter nearly perpendicular; on left side more rounded with normally placed long diameter.
6. Same drawer (182), second head toward rear of drawer. (Has loose ossicula in left ear). Same as above but more round-headed and shows large bone wound in frontal mid-line immediately above frontal sinus. Otherwise same as above. Auditory canals have long diameter more upward and anterior.
7. North Island (F.) (41512) (174)—Not deformed. Dolichocephalic. Bones thin and slight; styloids very long and strongly inclined forward, more than usual. Tympanic bones both dehiscant into glenoid fossae. Tympanic bones very thin and slight and canal large, with long diameter normal.
8. North Island (41529) (166)—Female. Same general character as above. Inclination of styloids forward. Tympanic bones not dehiscant and not large. Canals large, with long diameter normal.
9. North Island (41514) (173)—Female. Beautiful specimen. Bones much more massive than the above; not deformed, dolichocephalic; no dehiscant tympanics. Tympanic bones very thick and heavy. Canals normal, but not as large as in above, owing to thin tympanic bones in above.
10. (41528) (165)—Female. Bones heavy; head same as in (41514); tympanic bones thick and heavy; canals smaller than in the first of this set, but regular and normal in shape. Styloid strongly inclined forward, but broken. (Left side has a long thick exostosis posterior to jugular bulb and the digastric fossa).
11. North Island (41518) (157)—Male. Bones heavy and massive. (Had incus in left ear). Very long, strongly anteriorly inclined styloids. Dolichocephalic with rather flat frontal but not deformed. Tympanic bones not as thick and heavy as in one of the previous North Islanders, but have the thickened inferior elongation down along the styloids. Canals large, oval exostoses, and funnel-shaped extending inward. Long diameter normal.
12. Kwakiutl (40672) (1305)—Male. Very dolichocephalic, binding around posterior and coronal suture. Supra-occipital very elongated frominion to foramen magnum. Mastoid process at base is elongated and thickened antero-posteriorly. Zygoma very long and arch is flattened transversely.
13. Kwakiutl, North Vancouver Island (40521) (1307)—Female. Dolichocephalic. Apparently not bound, but flat frontal. Squamo-temporal is long antero-posteriorly. Auditory canals comparatively large and nearly round, the tympanic bones being comparatively thick and massive, and the skull small but comparatively massive.
14. Kwakiutl (May's Place, No. 28) (40528) (1304)—Dolichocephalic, artificial, circular bandaging. Base of mastoid very broad antero-posteriorly, squamo-temporal elongated from squamo-zygomatic juncture and linea temporalis has strong inclination upward and backward toward occiput. Bones not very massive. Tympanics rather slight and thin, and canals large, oval, with long diameter normal, but slightly shorter antero-posteriorly than normal.
15. Kwakiutl (Cape Commerall) (No. 66) (40507) (1318)—Strongly dolichocephalic; bandaging around posterior frontal and posterior to coronal suture and infra-occipital. Bones comparatively massive but

tympanics thin and slight. Canals small, but regular, except slightly shorter in antero-posterior direction than normal, and long axis perpendicular. Linea temporalis strongly inclined upward posterior to parietal eminence position, and base of mastoid immensely elongated and at juncture with sagittal suture a strong formation like accessory suture bones. The sagittal suture continuing down mesiad to the digastric fossa separating the mastoid from the supra- and basi-occipital, very open and free, showing that it must have been kept open for the development of this part of the skull as the other parts are more repressed (compensatory). (May see here the natural arrangement for skull growth).

16. Kwakiutl (40510 (1303)—Male. Dolichocephalic and has been circular bandaging but not very successfully. Shown mostly by elongation posteriorly of supra-occipital. Bones rather slight. Tympanics thin and canals as usual with long diameter upward and forward, downward and backward. Base mastoid slightly elongated but same complex bony arrangement at juncture with sagittal suture which suture is almost obliterated.
17. Kwakiutl, May's Place (40528) (1304)—Male. Dolichocephalic, but not strongly, has been bandaged as usual. Bones slight. Tympanics thin and canals large, oval, with axis normal. Mastoid bones are the same as in (40510).
18. Kwakiutl, North Cape Scott (40526) (1310)—Female. Bones heavy for female. Dolichocephalic but apparently never bandaged. Linea temporalis almost entirely horizontal in position but base of mastoid very wide antero-posteriorly. Tympanics thick and heavy, with long, heavy vaginal processes extending over on the styloids. Squamo-temporal-zygomatic very long antero-posteriorly and same formation bone at mastoid juncture with sagittal suture as before. Auditory canals small, but regular.
19. Kwakiutl (40786) (1309)—Female. Very dolichocephalic. Bones very slight. Bandaging circular around supra-occipital and posterior to coronal suture, scarcely any over frontal and squamo-temporal bone has been mostly excluded, but posterior part of the base of the mastoid is very elongated and complex at juncture with sagittal suture. Linea temporalis normal and that line seems to extend strongly upward only where bandaging has included the squamo-temporal. Tympanics comparatively thick and strong vaginal processes on styloids. Right canal is large and round. Left canal not so large but oval, and long axis is perpendicular. Supra-occipital is immensely elongated. A peculiar feature of this skull is that the elongation is so abrupt and constriction around is so acute that at squamo-temporal articulation with frontal and parietals these two bones on each side recede suddenly from the articulation, making the articulation a very prominent irregular ridge which is not quite so marked on right as on left because in frontal view the frontal is irregular (asymmetrical), the left antero-temporal region being more bulging outward than the right, which gives a shorter perspective in this view than on the right side, but again there is a slightly greater depression posterior to this where bandaging has been done, hence compensatory ridge on left anterior. Again there is a decided deviation of posterior part of the vomer running superior to left and inferior to right, at posterior margin the bone being thin as tissue paper and the hard palate being high but comparatively broad.
20. Kwakiutl (Cape Commerall) (40523)—Female. Very dolichocephalic. Bones very slight. Bandaging circular around supra-occipital and posterior to coronal suture, scarcely any over frontal and therefore temporal bone has been excluded, but posterior part of the base of the mastoid is very elongated and complex at juncture with sagittal suture. There has apparently been greater pressure on posterior part of squamo-temporal because it is not quite so elongated per-



- pendicularly. Auditory canals are narrow and slit-like with long axis perpendicular.
21. (40684+) (1201). Males. (Tribe Cowichan, Quamichan Village).—Salmon River—Very solid, heavy bones. Brachycephalic, from pressure either at upper angle supra-occipital and posterior angles of parietals or that combined with high frontal pressure. Skulls all irregular laterally with irregular high parietal eminences.
  22. (40684)—Very short supra-occipital from foramen magnum to occipital eminence and strong curve to upper posterior supra-occipital. Tympanics heavy, but not broad. Auditory canals both strongly funnel-shaped and oval, but long axis almost horizontal.
  23. (40738)—Very short supra-occipital from foramen magnum to occipital eminence and strong curve to upper posterior supra-occipital. Tympanics heavy but not broad. Auditory canals not so horizontal as above, but small and very flattened in a semi-antero-posterior direction. Linea-temporalis strongly turned up toward the compensatory elevated parietal eminences.
  24. (40877)—Very short supra-occipital from foramen magnum to occipital eminence and strong curve to upper posterior supra-occipital. Bones not so dense but tympanic bones thicker than the two preceding. Right auditory canal oval, and long axis nearly horizontal; left, irregularly round; (apparently an old person, some absorption in alveolar process).
  25. (Case 18. East Court, So.) Kwakiutl. No number—Artificial dolichocephalic, bandaging around frontal and posterior to coronal, extreme elongation supra-occipital, and parietals come to a single prominence posteriorly. Base mastoid very broad antero-posteriorly and a complex bony arrangement at juncture of sagittal suture. Bones not specially massive. Tympanics comparatively thin. Canals small antero-posteriorly, and long axis in left is perpendicular; in right, is removed from normal, extending upward and backward, downward and forward.
  26. Case 18. (40406 by Lieut. Staffard), Oruro, Bolivia.—Not massive, extreme elongation, but very regular from frontal sinus to apex of parietals. Left temporal bone is absent. Right tympanic is very thin and dehiscant in glenoid fossa. Canals very large and oval, with longer axis inclined upward and backward, downward and forward. (Fine subject to study spheno-ethmoid angle).
  27. Case 18. (40399). Arica, Peru—Extreme elongation from frontal sinus to crown of parietals but latter not so pointed as in (40406). Frontal most compressed and again posterior to coronal suture. Linea-temporalis has strong inclination upward and backward toward juncture of occipital with parietals. Mastoids long antero-posterior base but made mostly by accessory bone on left side in sagittal suture and same on right side. Tympanics thin and slight. Canals ovoid, with long axis perpendicular.
  28. Case 18. (50413). Huaracundo, near Cuzco, Peru—Very young, twenty years or so. (Beautiful head for study of sutures and nasal septum). Bones slight and thin; elongated not extremely, but markedly, with greatest compression posterior to coronal suture. Supra-occipital very long and has interparietal bone, also each Glaserian fissure contains small oval intercalary bone. The tympanics are very slight and thin, left has dehiscence and right is very thin in spots. Auditory canals large, right one larger than left, and more nearly round, but still ovoid as is the left. Accessory bone in right Glaserian fissure larger than left and long axis of canals perpendicular. Ravinian notch in either ear very broad owing to the fact that the tympanics do not extend up posteriorly on the mastoid except to just form the floor and curve. Linea temporalis strongly inclined upward and posteriorly; mastoid much elongated back towards sagittal suture.



29. (40278). Case 20. Inca, from Huaraco, Peru—Markedly elongated with lateral depression over frontal and dehiscence posterior to coronal suture. Bones comparatively massive. Mastoid part of temporalis seems to have developed immensely to the loss of the posterior part of the squamous, the articulation of squamo-temporal and parietal making a straight line leading rapidly downward as it extends posteriorly from a point immediately over (or above) the squamo-zygoma. All the sutures except the sagittal are very straight (not corrugated) and all sutures, except sagittal, are ossified almost entirely. Tympanic bones thin, but wide supero-inferiorly to fill in wide declivity between zygoma and largely developed mastoid, and tympanics have large vaginal processes and tympanics do not extend up on the anterior wall of the mastoid, except as above, enough to form the floor of the canals and become attached to mastoid. Canals large, oval and normal axis.
30. Case 21. (40279). Inca, from Cuzco, Peru—Moderately elongated. Skull thick and bones of mastoid developed back to sagittal suture and very complex at juncture. Tympanics thin and wide but with comparatively large vaginal processes and very long styloid. Dehiscence in right glenoid. Auditory canals large, ovoid, funnel-shaped, with long axis normal. (Malleus and incus in right middle ear removed). Right canal much larger than left and posterior to digastric fossa a long tubercle which has extended down ends by a square facet which has apparently articulated with the lateral process of the first vertebra (paramastoid?).
31. (40669). Case 23. Kwakiutl. Bones medium, but very elongated as other Kwakiutl skulls, extreme frontal and posterior coronal depression. Mastoid very elongated posteriorly and complex articulation with occipital; right has extremely long styloid. Linea temporalis much inclined upward and backward. Tympanics comparatively thick, canals oval, comparatively small and upper anterior edge both sides turned downward into top of canals but no nodular enlargement.
32. (40112). Case 24. Thick, heavy bones. Peruvian. Brachycephalic, artificial frontal and occipital pressure with both tympanic bones curled up at postero-inferior edge, and large nodule almost entirely filling canals.

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## HYPOPHYSEAL TUMOR FROM THE RHINOLOGIST'S POINT OF VIEW,—REPORT OF CASE.\*

BY GEORGE MC BEAN, M. D., CHICAGO.

I recently reported to the Chicago Neurological Society a case which was of peculiar interest to both neurologists and rhinologists. It was that of a tumor of the hypophysis cerebri that had invaded the sphenoidal sinuses and caused eye-symptoms. Three rhinologists and one oculist agreed with my tentative diagnosis of sphenoidal disease producing optic neuritis and paresis of the right external rectus muscle, before the real diagnosis was made.

Much has been written in the last three years on dyspituitarism, but little has been said of the tendency of hypophyseal growths to involve the sphenoidal sinus. Distending the sella turcica, as they do, it does not seem strange that the bone, forming the roof of the sphenoid and the floor of the sella, which is normally only about one millimeter in thickness, should necrose, and the growths press into the sphenoid. Nature takes this method of reducing intra-cranial pressure, and brain surgeons have been slow to take the hint in following the sphenoid route for operations on the pituitary. So rhinologists should remember the possibility of finding a brain tumor when they open a sphenoidal sinus. Onodi, of Budapest, and several writers in this country have called our attention to the relation of the optic nerve to the sphenoid, but we must not forget the intimate relation of the pituitary also.

My patient, Miss S. E. K., age 36 years, was referred to me March 14, 1910, by Drs. H. R. Chislett and J. H. Low, for a diplopia of recent development.

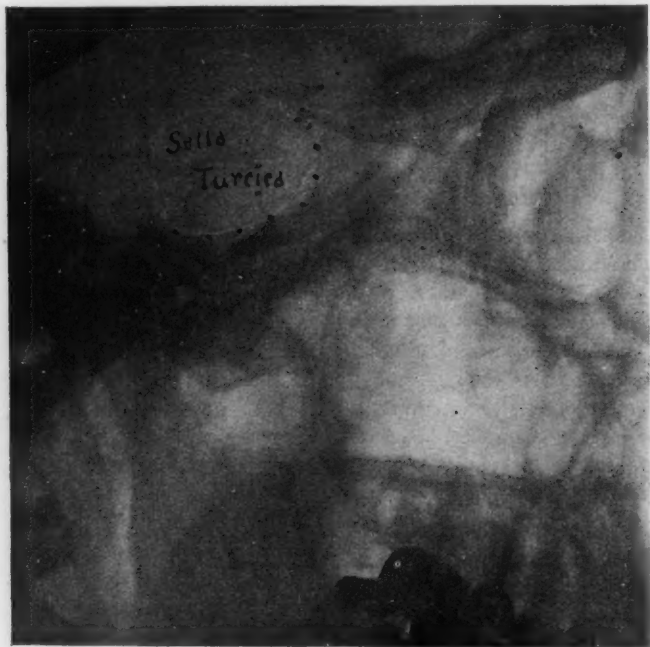
Present condition: Height, five feet, ten inches; weight, 160 pounds. Eyes prominent, left pupil slightly dilated. Right external rectus paretic. Vision: Right eye, ten-tenths; left eye, eight-tenths. Some metamorphopsia in both eyes. Fundus shows bilateral papillitis, + 1.00 D. in the right + 2.00 D. in the left. Perimeter shows form field slightly contracted, color fields partly overlapping, natural blind spot slightly enlarged.

Anterior nasal examination was negative.

\*Read before the meeting of the Chicago Neurological Society, December 21, 1911.

Post-nasal examination showed a small polypus in the right naris, coming from the ostium sphenoidale. On probing the sinus I found it diseased, so made the tentative diagnosis of optic neuritis and right abducens paresis, secondary to nasal sinus disease. I advised operation.

Then, and not till then, I was given the information withheld by the patient before, that Dr. Hugh T. Patrick had made a diagnosis



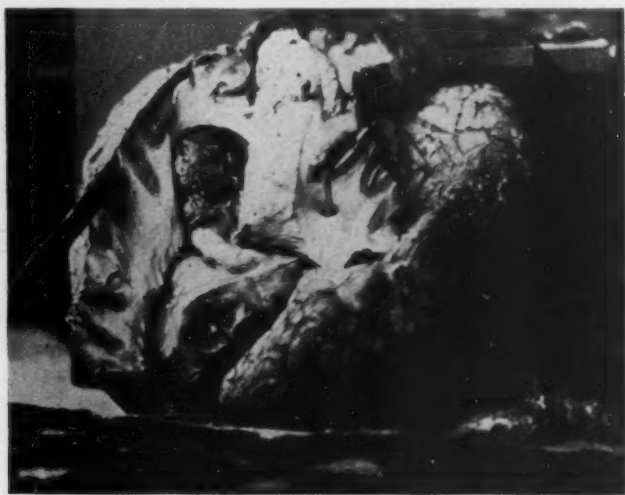
Skiagram of the head, showing deep sella turcica in case of tumor of hypophysis cerebri. (Miss S. E. K.)

of brain tumor only a few days previously. Her family declined to accept his diagnosis and insisted on trying the nose operation.

She also gave me a history of amenorrhea since she was 28 years old, and an increase of fifty pounds in weight coincident with the cessation of the menses. In August, 1909, she had had an acute rhinitis, following which the eye symptoms had developed. The diplopia was the most recent development. There had also been a transient, non-inflammatory edema of the ocular conjunctiva, on several occasions.

At the family's solicitation I removed the polypus and opened the sphenoid. I found the cell packed with a mass resembling poly-poid tissue. I curetted out as much as I dared and sent the specimen to Dr. W. A. Evans, who reported "probable sarcoma." The relief was marked. Vision came up to normal within a week, and the paretic external rectus muscle also began to improve.

Within three weeks the sinus began to fill in with tissue again, and I asked for consultation. Dr. G. E. Shambaugh, Dr. E. V. L. Brown, Dr. Alfred Lewy and Dr. H. Manning Fish saw her with me. All agreed as to the probable source of the eye trouble being in the sphenoid, and advised further operation.



Photograph showing right lateral ventricle of brain containing part of tumor of hypophysis cerebri.

This was declined and the patient left the city the latter part of May and "read Christian Science" instead.

November 18, 1910, I saw her again, after an interval of six months. There was a paracentral scotoma in the left eye. Vision in the right eye had sunk to six-tenths. The fundus had not changed in appearance. The mass had begun to project from the open sphenoidal sinus. She declined any treatment and went to California.

In January, 1911, after telegraphing me, she consulted a physician in San Diego, as she was suffering severely from headaches,

with mental disturbances, transitory loss of memory and increasing loss of vision. He gave her potassium iodid, and the effect apparently was remarkable. The pain stopped at once and she returned to Chicago.

February 21, 1911, I had the Wassermann test made by the Chicago Laboratory, who reported it "positive to a moderate degree." On the strength of this we increased the dose of potassium iodid and gave her intramuscular injections of mercury daily.

I also had skiagraphs made by Dr. Paul Cliver and Dr. Max Reichmann, both of which showed a greatly enlarged sella turcica. This convinced me of our error, so I called Dr. Julius Crinker in consultation. He at once made the diagnosis of tumor in the region of the sella turcica, causing an increase in intra-cranial pressure and the choked disc. Her vision at this time was further reduced, the scotomata were larger, and she showed a bi-temporal hemichromatopsia.

On April 20, 1911, she was operated by Dr. Harvey Cushing at Johns Hopkins Hospital. I quote from his notes as follows: "There is evidence of a large growth which has broken through into the cranial fossa itself, as shown by the general pressure symptoms: Bilateral choked disc (+ 2.00 in the right, + 3.00 in the left); primary optic atrophy; central scotomata; vision low in both eyes. There is increased carbo-hydrate tolerance; sub-normal temperature; low blood-pressure; adiposity; dry skin. No acromegalic facies, and no definite bone changes in the hands. Wassermann negative. Operation: Sub-labial approach, sub-mucous resection of the nasal septum. Removal of large portion of growth from sphenoidal sinus and distended sella turcica."

May 17, 1911, she returned to Chicago practically blind from the large central scotomata. During the summer the vision failed completely, the lapses in memory became more frequent and the headaches more severe. August 10, 1911, she entered the hospital with even worse pain in the head. September 15, the pain suddenly ceased, probably from a leak of cerebro-spinal fluid, and her mind cleared remarkably. She was comparatively comfortable for a month, then the pain returned and she died October 20.

The post-mortem by Dr. Chislett showed a large tumor in the sella turcica, adherent to the bone, projecting into the sphenoidal sinuses and involving the descending horn of the left lateral ventricle. Specimens of the tissue were sent to Dr. Harvey Cushing, who calls it a chromo-phob-adenoma.

Dr. W. H. Wilson thinks it is a round-cell sarcoma, and Dr. Dean Lewis a carcinoma.

We clinicians may be excused for not making an early diagnosis in such an obscure case, when the pathologists, by their exact laboratory methods, cannot agree on the diagnosis of tissue under their microscopes.

Dr. Hugh T. Patrick, in a letter dated April 4, 1911, says, "I was unable to make a definite diagnosis, but wished the patient to remain in Chicago for further observation." Personally I believe it would have been impossible to make a definite diagnosis, except by a properly interpreted skiagraph showing the deep sella turcica.

Wassermann reactions should be reported as positive or negative. Much time was lost in this case by the report, "positive to a moderate degree," especially with the co-incident improvement under anti-specific medication. It is hardly probable that the Johns Hopkins' Wassermann would have been completely negative, even after her medication, if there were a specific basis.

I do not see the advantage of the sub-labial approach rather than the intra-nasal, for in this patient there was a large septal perforation after the operation evidently due to tearing during the sub-mucous resection.

Note:—Harvey Cushing in his book on "Pituitary Body Disorders," 1912, includes this as Case XI. Pages 81 to 85.

815 Marshall Field Building.

**Post-operative Tonsillar Hemorrhage.** J. E. SAWTELL. *Jour. of Ophthal. and Oto-Laryngol.*, June, 1912.

The various causes of bleeding, as well as a description of the vessels from where it comes and various methods of controlling the same are described.

Where the bleeding vessel can be readily seen it is best seized by forceps and crushed. If difficult to make out, grasp the superior constrictor muscle with the forceps and draw towards the pillars and the bleeding vessel can more readily be seen and grasped and also ligated if necessary. Bleeding from the lower portion of the tonsillar fossa is better seen by drawing the anterior pillar forward.

STEIN.

## TUBERCULOSIS OF THE TONGUE.\*

BY SILVIO VON RUCK, M. D., ASHEVILLE, N. C.

Although my subject deals with a comparatively infrequent localization of tuberculosis, cases in which the tongue is the seat of the disease are nevertheless liable to be met in general as well as in special practice, and in instances where the primary affection is causing no decided symptoms, or if the latter do not point to the lungs, the diagnosis is liable to be much obscured by other considerations which delay proper therapeutic measures, at a time when a recovery is possible. Many observers have heretofore considered the outlook of tuberculosis of the tongue as practically hopeless, and at best amenable only to radical surgical procedures, and this in instances in which the patient's general condition is comparatively good. In such cases my own experience would indicate that specific treatment by immunization offers most satisfactory prospects, without the mutilation of an organ so essential in its function.

Before speaking of the cases illustrative of my contention, I wish, however, to review briefly what appears to me important in the etiology and diagnosis of this affection.

As in many other localizations excepting in the lungs, tuberculosis of the tongue was not recognized until the early part of the last century when Portal<sup>1</sup> reported the first case. Morgagni's reference<sup>2</sup> to tubercle of the tongue, in which he mentioned a case observed by himself and one by Marianus, is rather obscure, and as the term tubercle was at that time used only in a descriptive sense, the reference does not permit a decision as to whether or not his case and that of Marianus were actually instances of tuberculosis.

After Portal, Louis, in 1825, described several cases, and after him occasional instances are recorded, as, for example, by Renaud, in 1831, Fleming, in 1850, Gildmeister, 1852, and in 1858, Paget. Wagner<sup>3</sup> reported a case in 1862 and Virchow<sup>4</sup> an observation on the cadaver in 1864.

Reports of instances of lingual tuberculosis became more frequent thereafter. Euteneuer<sup>5</sup> described the first instance of a primary case in 1872, the tuberculous growth having been extirpated upon an erroneous diagnosis of carcinoma. Such supposedly primary cases

\*Read before the meeting of the Tri-State Medical Association, February 21, 1912.



appear subsequently in literature in greater numbers and in Fairlie's case<sup>6</sup> an autopsy showed the lungs normal. Nedopil<sup>7</sup> reported four primary cases from Billroth's clinic in Vienna in 1876 and many others have been published since, Beadle's case among them,<sup>8</sup> being one of the miliary type, in which trauma appeared to stand in relation. Gleitsmann's case,<sup>9</sup> published in 1888, also claimed as of primary origin, is of interest on account of the permanency of the cure as shown by later reports.<sup>10</sup> Many more recent contributions to the literature, as for instance by Delavan,<sup>11</sup> and especially by Dobberstein<sup>12</sup> (who also gives an exhaustive review and reference to many other cases prior to 1900) showed that tuberculosis of the tongue was not so rare as had been supposed.

The question of a primary infection has been a much discussed one ever since Euteneuer reported his case, but as far as my available literature shows, most, if not all others were so diagnosed, upon clinical grounds only.

The infrequency of tuberculosis of the tongue in cases of open phthisis would appear most remarkable, were it not for the natural protection afforded by its thick epithelial cover, its mucous and the salivary secretion, in addition to the natural mechanical removal of substances brought in contact by eating and drinking and by its function in speech. The retention of tubercle bacilli for a long enough time to permit absorption or germination upon the tongue is thus antagonized to a degree that amply explains the infrequency of contact infection with bacillary sputum, until through a state of physical exhaustion these protective agencies more or less disappear and the ordinary hygiene of the mouth suffers by the helplessness of the patient.

Of the nineteen cases of tuberculosis of the tongue which have been observed in the Winyah Sanatorium, fourteen belonged to this terminal stage of phthisis, the ulceration appearing shortly before death from the exhaustion due to the existing pulmonary disease. The origin of the ulcer in instances which we could examine early enough to determine this, was invariably from small clusters of gray or grayish-yellow miliary tubercle which caseated and broke down in the course of a day or two, leaving a minute superficial defect.

In six cases the ulcer was single; it was located at the tip of the tongue in four, and laterally in two cases. In four cases two or more ulcers were found at about the same time; they were located at the tip and at the edge of the tongue in two cases, at the tip

and the frenulum in one, at the tip and both sides in the fourth case.

Six of the fourteen patients claimed preceding traumatic injury to the tongue, from carious sharp-edged teeth in two, from biting the tongue accidentally in one, and from injury by a fish-bone in another. Eight of the patients had no recollection of trauma having occurred. In five cases the tongue affection made its appearance at an earlier period, and at a time when the patient's general condition had not been seriously impaired.

In four of these the seat of origin was evidently in the deeper tissues, starting in two cases with a tumor-like, conglomerate tubercle which on first detection had not involved the mucosa; in one case ulceration did not occur at all, in one case a deep abscess had formed which was evacuated by incision.

The fifth case when coming under our care presented ulceration on both sides with deep and massive infiltration on the left, and a slighter degree on the right side, but the disease had not been discovered until ulceration had occurred, for the first appearance of which a carious tooth situated exactly opposite was supposed to be responsible. None of the other four patients knew of any preceding injury to the tongue.

I believe that all the 14 cases in the terminal stage of phthisis represented instances of local infection with bacillary sputum, and that in the last one of the five other cases this mode of infection was the more probable one. In the other four cases the origin of the local disease can be best explained by assuming transport of tubercle bacilli through the circulation.

The frequency of tuberculosis of the tongue based upon anatomical findings has been variously stated. Willigk<sup>13</sup> found only two cases in 1317 autopsies upon tuberculous subjects. Fischer, according to Dalla Vedova,<sup>14</sup> gives six cases in 1500. Fowler and Godlee,<sup>15</sup> four cases in 382, Chiari,<sup>16</sup> twelve in 625, and Warthin,<sup>17</sup> one case in 41 such autopsies. Taking their totals, we find 25 instances of lingual involvement in 3,935 autopsies upon tuberculous subjects, or in 0.63 per cent.

The frequency based upon clinical observations varies greatly with the material of individual observers. Hamel,<sup>18</sup> who gives statistics of tuberculous complications in German Sanatoria in which only comparatively early-stage cases were admitted, records only one instance in a clinical material of 12,369 cases. On the other hand, Chappell<sup>19</sup> observed fifteen cases in his clientele in so short a time as six years.

The nineteen cases which were observed in the Winyah Sanatorium during a period of twenty-three years in a total of 5,000 patients give a clinical frequency in phthisis of 0.38 per cent.

Authors who mention the age and sex of the cases, or examined the reports of other observers, are of the opinion that tuberculosis of the tongue may occur at any age. I find, however, but very few cases recorded as having been observed in children, most of the patients being young or middle-aged adults. As an instance of its occurrence at the other extreme of life, Zintmaster<sup>20</sup> records the case of a man aged 80 years; carcinoma was erroneously diagnosed and after operation the examination of the diseased tissue showed it to be tuberculous. The ages of the cases observed in my clinical material varied between 20 and 48 years.

As to sex, most writers who refer to it speak of the relatively greater frequency in the male; a difference in sex appears also in our cases, there being eight males to six females in the miliary form, and three males to two females in the tumor or nodular form.

The symptoms observed in our cases, were entirely local. The patients with superficial ulceration occurring toward the end of life, complained only after the miliary tubercle had broken down and then chiefly of a stinging pain, aggravated by speaking, mastication and swallowing of food. With marked infiltrations and in the tumor-form there was interference with the motility of the tongue, causing more or less thickness of speech and inability to move the food bolus in the mouth. Two of these latter patients could not take solid food at all. When marked infiltration was associated with ulceration, salivation was more or less pronounced.

None of these symptoms are, however, peculiar to tuberculosis of the tongue and are therefore of no material aid in diagnosis.

The surface ulceration due to breaking down of miliary tubercle is not difficult in its recognition, the chief characteristic, namely the presence of miliary tubercle in the edge of the ulcer, being rarely missed even on the first careful inspection in a good light, in which the use of a weak magnifying lens gives additional aid. Successive formation of new tubercles at the edge of the ulcer is the rule, and if perchance they are missed at the first, they are liable to be noted on subsequent inspections. We have found them in all our cases, and in several instances in which exfoliation of the epithelial covering had not yet occurred, the tubercles could be seen in groups of minute grayish or grayish-yellow elevations, shining through the epithelium.

The formed ulcer is first quite small, the size of a pin-head or a little larger, usually covered with a yellowish cellular detritus or as it grows larger with pale-red flabby granulations, and it continues so through its entire course, growing larger by breaking down of the new tubercles which continue to form on the edges, and by confluence of adjacent ulcers.

There is in this form no marked infiltration, and no tendency to penetrate the deeper tissues, unless the patient lives longer than is usually the case.

When the differentiation of benign excoriations and simple ulcers due to trauma should require to be considered, their rapid course will not leave us long in doubt. They are not painful as are tuberculous ulcers, have a red, granular base and heal quickly. In aphthous ulcers the red inflammatory areola which surrounds them, their white lardaceous base elevated above the niveau, their transitory character and the formation of successive crops, are characteristic enough to preserve us from error, although they resemble tuberculous ulcers in painfulness and in size.

The diagnosis is more difficult in tuberculous infiltrations and conglomerate tubercle of the deep substance of the tongue, especially at a time when the mucosa has not as yet been penetrated, but even after the occurrence of ulceration, syphilis and carcinoma must often be differentiated particularly in cases in which no other manifest tuberculosis is present. In tuberculous patients we naturally think of tubercle when our attention is directed to a tumor-like mass in the tongue-substance, and if we then exclude syphilis and by the absence of marked pain and enlargement of the regional lymph glands, with a consideration of the age of the patient, can practically eliminate carcinoma, we shall rarely fail to be correct if we diagnose tuberculosis. For further confirmation we may resort to the tuberculin test, but without distinct increase in pain and swelling in the involved area, a general reaction gives no positive aid, not even in those who have no manifest tuberculous lesions in their lungs or elsewhere. The tuberculin test is, however, of more avail after the occurrence of ulceration, inasmuch as then the local reaction manifests itself to the sense of sight by increase of secretion, redness and swelling of the ulcerated surface, whereas in the absence of ulceration we must depend much more upon the patient's sensation. A negative result of the test cannot be utilized differentially unless the trial dose has been large and the establishment of toleration by small preceding doses has been avoided.

In addition to the clinical history or the presence of other syphilitic lesions and of characteristic scars, especially upon the skin, the pharynx, epiglottis and the nasal septum, we have in syphiloma of the tongue a valuable aid in the therapeutic test with potassium iodid, and with Ehrlich's salvarsan; the rapidity of the action of the latter would particularly suggest its use in cases where delay must be avoided and the evidence of syphilis is strong.

There is, in syphilis, as a rule, but slight or no enlargement of the regional (submaxillary) lymph glands, and the nodular or gummatous lesions are said to occur more often in the center of the tongue. Syphilitic ulcers of broken-down nodules or gummata are usually deeply excavated or soon become so (as they break down from the center); their limit is sharply defined, they have thickened edges and when they heal it is from the center toward the periphery, contrary to tuberculous ulcers in which the course of healing is reversed. Syphilitic ulcers are not specially painful, quite in contrast to carcinoma in which pain occurs early, even before ulceration, and is much more severe than in either tuberculosis or syphilis in which pain rarely occurs prior to ulceration. Recourse to the Wassermann test in suspected cases can give additional aid in the recognition of the latter.

In differentiation of carcinoma from tuberculosis, tumor, and from tuberculous ulceration upon a subjacent deep infiltration, we may consider that carcinoma is very rare before the age of 30. The early involvement and marked enlargement of the regional lymph glands in carcinoma is an important point in its favor.

In malignant disease, even when the tongue is at rest, the pain is very severe and radiates to the ear, the larynx and the lower maxilla. Salivation is also severe and fetor is often present. The rapid loss in weight and strength is likewise suggestive in differentiation from the so-called primary tuberculous lesions of the tongue in which the nutrition at first is not materially impaired. The carcinomatous mass is also much harder when palpated. With the advantage of the tuberculin test and microscopical examination of secretions there should rarely be the necessity of excising tissue for histological examination if the case be one of tuberculosis. This may, however, become necessary in order to determine that the tumor is actually carcinoma.

In tuberculous ulcerations upon a deep infiltrated or nodular base tubercle bacilli can frequently be found in the secretion and by the use of sufficient precaution it is possible to avoid error due to

tubercle bacilli derived from sputum when the affection occurs in a case of open phthisis.

We found tubercle bacilli in large numbers in the pus of a case of tuberculous abscess of the tongue of a consumptive, and in another case in which no sputum was present the examination of some of the expressed secretion likewise showed their presence.

The prognosis of tuberculosis of the tongue has always been considered very grave. Volkmann, writing in 1885, states, that although in some of his cases treated by the application of the thermo-cautery or by excision, the lesion healed, most of them died of phthisis. Cases of healing had been observed previously as by Strohymer in 1864, by Laboulbene in 1874 and by Leloir in 1879. Delavan, in 1887, stated the prognosis to be absolutely bad. Butlin, writing in 1900, considered it almost as unhappy as that of carcinoma and considered the patient fortunate in being relieved by death through a rapid course of tuberculosis of internal organs. Sabourand<sup>21</sup> more recently assumes a more favorable attitude, he having observed two cases which were treated successfully by local applications.

It remains a fact, however, that the great majority in which the ulcers were brought to heal through local applications, recurred, and in instances where radical operative measures were adopted, the patients, as a rule, died of tuberculosis of the lungs.

I shall not detain you long in considering the methods of treatment that have been and are now recommended. In my reference to the prognosis I have indicated the common experience of recurrence of the local affection when healing had exceptionally occurred from the use of local applications, such as lactic acid, with or without curettement, and in instances of radical surgical interference the great majority of the cured cases succumbed to pulmonary tuberculosis within a year or two after the operation.

My purpose being to direct your attention to specific treatment, having for its object the induction of active immunity, and thus influencing not only the local manifestation of the tuberculous process upon the tongue but also the primary affection of the lung or of other organs, I may first mention the cases treated with the old tuberculin at the time of its first introduction, namely one by O. Brieger,<sup>22</sup> of lupus of the tongue in Prof. Neisser's clinic in Breslau, which was cured; one case each by A. Fraenkel<sup>23</sup> and by Tangl<sup>24</sup> reported about the same time of tuberculosis of the tongue secondary to pulmonary phthisis, in which the remedy was appar-



ently without influence. Two years later Browne<sup>25</sup> reported a case of oral and laryngeal tuberculosis co-existing with phthisis, in which the tongue was also involved, and in which he saw some improvement from the use of tuberculocidin (Klebs); and excepting the five cases treated at the Winyah Sanatorium, and which were briefly described in its bi-annual reports, I find no further instances in literature in which specific treatment had been resorted to for the affection under consideration.

The uniformly favorable results in our five cases, under the use of an improved preparation (*tuberculinum purificatum* von Ruck) in the first case, and of the watery extract of tubercle bacilli in four subsequent cases, and the successful treatment of pulmonary and other forms of local tuberculosis during the last twenty years with products of the tubercle bacillus, give sufficient assurance that I am not in error when I attribute the respective cures to the method of treatment employed.

Four of the five cases so treated are now living and in good health, having experienced no relapse of their pulmonary affection or of the local disease of the tongue after periods of fifteen, twelve, seven and six years respectively, since their discharge.

The patient who died was treated in 1903 and the affection of the tongue was present on her admission, her lung disease, although involving both sides extensively and with a large suppurating cavity on the right side, became likewise arrested and the cavity had become dry when she left the institution. Up to the time of her sudden death from a large pulmonary hemorrhage, three years later, the tongue had remained healed.

I desire to report to you with more details than were given in our bi-annual report for 1905 and 1906, our last case of this class, treated in 1906, inasmuch as the affection was a very severe one, the case being also of interest in respect to its etiology and diagnosis.

The patient, a young woman, age 20, the daughter of a physician, first noticed a sore spot on the left side of her tongue and her father detecting some erosion, considered it of no material import, but as the location was opposite a carious tooth, thought irritation from its surface to stand in relation and consulted a dentist who gave the necessary attention to the tooth. The affection was, however, obstinate, the ulceration extended and the induration in the substance of the tongue increased. After several months of symptomatic treatment he called upon some of his local colleagues for



advice, and without material aid in its treatment as suggested by them, he sought the advice of several surgeons and other colleagues in his nearest medical center. The condition found by them failed to suggest tuberculosis, her age speaking against carcinoma, and syphilis being likewise excluded from serious consideration—palliative local applications were continued until the deep infiltration and pain began to seriously interfere with the motion of the organ in speech, mastication and swallowing of food, and a second ulceration had appeared on the opposite side. At this juncture radical surgical interference was proposed to which the father refused consent until he could have at least a positive diagnosis of the nature of the disease. The possibility of its tuberculous nature having now been suggested, he brought his daughter to the Winyah Sanatorium to have this latter question settled, if possible. In the meanwhile eight months had elapsed since the first appearance of local symptoms and the patient had lost greatly in weight and strength.

Our inquiry revealed a tuberculous family history; the patient, however, had, according to her father, shown no signs of tuberculosis and especially no symptoms on the part of her lungs. Closer questioning, however, brought out the fact that several months before the advent of the tongue affection, she had a mild attack of bronchitis from which she seemed to have recovered under symptomatic treatment. Otherwise her health had always been considered good.

Examination of the tongue revealed a longitudinal ulceration on the left side beginning opposite the first molar tooth and extending toward the base of the tongue a little more than an inch in length and of irregular width, the latter varying from one-fourth to one-half inch. The edges were not thickened nor undermined and the surface in greater part was covered with flabby, pale-red granulations; near the center the ulcer appeared much deeper, and discharged there a purulent fluid. The tongue on this side appeared considerably thickened; the mass was not, however, nodular, not sharply defined, and extended nearly to the center of the tongue, which was otherwise heavily coated. On the opposite side was a quite similar ulceration about half the size, showing a slight degree of infiltration.

Further examination of the left ulceration showed it distinctly fissured; from the central, more excavated part gentle pressure caused the discharge of several drops of a purulent fluid in which subsequent examination showed numerous tubercle bacilli. Still

closer inspection under a magnifying lens showed the presence of clusters of grayish-yellow miliary tubercle upon and near the edges of both ulcerations, and the diagnosis was thus practically assured, even without the discovery of physical signs in her lungs which bespoke a tuberculous process, with a small dry cavity in the right upper lobe, and a small area of infiltration in the left apex.

In the light of the success with our previous cases of tuberculosis of the tongue which had been treated in the institution, the patient was at once placed upon specific treatment with watery extract of tubercle bacilli in the early course of which reactions of the tongue-lesions occurred twice, attended with increased salivation, pain and swelling. With the first reaction several apparently new groups of miliary tubercle became visible on the upper surface of the tongue a slight distance from the ulcer on the right side. With the second local reaction of the tongue lesions, the infiltration in the apex of the left lung also showed a local reaction consisting of increased roughness of the respiratory murmur in the involved area and a sense of stickiness, suggestive of moisture. A slight rise of temperature of  $0.5^{\circ}$  F. occurred with this second reaction.

The favorable influence of treatment began to show itself after the second week by the end of which the salivation and local pain had become decidedly less and the surfaces of the ulcerations had become clean; by the end of the first month, the healing of the ulcers had well started from the edges, the infiltration on the left side was greatly reduced, and that on the right side barely perceptible. At the end of three months both ulcerations were healed, the infiltrations had completely disappeared as had all physical signs in the left apex; in the right upper lobe, a soft blowing character in expiration over the seat of the supposed cavity and a bronchial element in its immediate vicinity were all there was discernible. The patient on her discharge was free from all symptoms, had regained her normal weight, and in a letter received from her only a few days ago, she states that she has continued in perfect health.

In conclusion I wish to point out that the value of specific treatment in tuberculosis is now no longer questioned by the profession as it was at the time when these cases were first published in the reports of my institution. But gratifying as the results have been with these and with other tuberculous complications, it would have been much better, if they could have been prevented. My belief that this is possible, I can support by the fact that no secondary localizations of any kind occurred in those of our pulmonary cases

in which specific treatment was applied in the early stage and before destructive changes had occurred.

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### Diagnosis and Therapy of Laryngeal Carcinoma. J. FEIN. *Monatschr. f. Ohrenh.*, Bd. 46, 1912, p. 69.

Fein reports in detail the clinical history of a case of laryngeal carcinoma, in which tracheotomy was performed seven years after the onset of the symptoms and which resulted in death 1½ years later. The diagnosis was verified by examination of the numerous specimens removed during the progress of the disease. The slow and mild course pointed to the possibility of the diagnosis having been wrong and caused the delay of the radical operation.

Fein discusses the value of microscopical examination in cases of laryngeal carcinoma, the contradictions between the clinical and microscopic findings, and the therapy.

ED.

## SOME UNTOWARD AFTER-EFFECTS OF TOO RADICAL TONSILLECTOMY.\*

BY J. A. STUCKY, M. D., LEXINGTON, KY.

The object of this report is not to start a discussion of the merits of tonsillectomy versus tonsillotomy, nor the indications and technic of the operation. Within less than a year I have seen a sufficient number of cases in consultation showing untoward and displeasing results from too radical removal of the tonsils to feel justified in bringing the subject before the section.

There is no surgical operation performed more frequently than the removal, complete or partial, of the faucial tonsil. Waiving the consideration of the function of these glands, if they have one:

*First.* I do not believe that complete tonsillectomy should be advocated as a routine procedure. The topic and scope of this paper does not permit of giving reasons for this conclusion. I have claimed for years that tonsillectomy should be regarded as a major operation and as such should be performed in a hospital with careful surgical technic.

*Second.* In many, probably in the majority of cases where tonsillectomy is performed, there is more or less injury done to the pillars of the fauces. In removing the tonsils and capsule some shreds of muscular tissue are usually cut or torn off and are adherent to the removed gland. Even should this not occur, the muscle is left uncovered, hence unprotected, over the area to which the capsule of the tonsil was adhered.

*Third.* Tonsillectomy is not a simple operation nor is it free from danger, yet it is being performed more frequently by general practitioners and embryo specialists than any operation in surgery. In this report I do not refer to that most dreaded of all sequelae hemorrhage, though the number of these is alarmingly on the increase. The untoward after-effects of too radical removal of tonsils that I have personally seen, weeks and months after the operation, were in children and young adults, some operated upon by laryngologists of both experience and skill, others by general practitioners.

I have seen one case of facial paralysis lasting for five weeks. This case was operated upon by a well-known laryngologist, and

\*Read at the meeting of the Middle Section of the American Laryngological, Rhinological and Otological Society, Cincinnati, Ohio, February, 1912.

there was a cellulitis following the operation. Two months after, the cicatricial tissue between the anterior and posterior pillars had the appearance of that so often seen following syphilitic ulceration. I have seen three cases in which a claim was made of marked impairment of the voice, especially of the high tones. One of these cases was a well-known tenor singer who was not only worried about having lost a one-half tone of his voice as a result of the operation, but threatened to make it unpleasant for the operator. In two other cases the pillars of the soft palate were out of alignment due to cicatricial contraction, causing tension and interference with palatal movements, making swallowing a discomfort. As one child, 14 years of age expressed it, "I do not swallow as well on one side as I do on the other." The anterior and posterior pillars were matted down by adhesions, causing the traction to be so great around the fossa of Rosenmueller as to cause a partial closure of the Eustachian tube with subsequent tinnitus. In three other cases the uvula had been caught in the loop of the snare as it was being placed around the tonsil and was removed with the tonsil. In two other cases there was a loss of tonicity of the tensor palati and levator muscles, which resulted in the regurgitation of fluids through the nares, lasting for several weeks. This was evidently due to the great traction made with the tonsillar forceps which was necessary to pull the tonsil out so as to make a dissection. In other cases besides these spoken of to me by the operators, there was one case of fatal hemorrhage a few hours after the operation, two cases of cellulitis involving the entire neck, and nine cases of secondary hemorrhage requiring a second anesthesia and tying a spurting vessel or plugging the space between the pillars and sewing the pillars together.

Short Street.

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**Eustachian Bougies of Fuse Wire.** JOHN S. WEAVER, *Jour. of Ophthal. and Oto-Laryngol.*, Aug., 1912.

Electrician's fuse wire of 4 and 6 amperes is recommended as a substitute for rubberized silk and celluloid Eustachian bougies.

STEIN.

### THREE CASES OF ACUTE FOLLICULAR TONSILLITIS WITH UNUSUAL SEQUELA.\*

BY SAMUEL MC CULLAGH, M. D., NEW YORK CITY.

The first and second cases of this series I had the opportunity of seeing personally. The history of the third case, presenting some points of similarity, has very kindly been furnished me by Maj. S. H. Wadhams, U. S. A., under whose care the patient was. I am also indebted to Maj. Wadhams for the privilege of seeing the first case and much of the history contained herein. The second case was under the care of Dr. L. A. Coffin, and I am indebted to him both for the history of the case and the privilege of reporting it.

*Case 1.* (History by Maj. Wadhams): "D. C., age 30, came to see me on the morning of January 30, 1912, complaining of a sore throat. Examination showed a beginning follicular tonsillitis with numerous patches of exudate on the right tonsil but none on the left. His throat was disinfected and the tonsil wiped with a 25 per cent solution of argyrol. He performed all his duties that day until noon when he went to New York and attended the theater. His throat became more painful during the afternoon, and on the train returning to the Post about 6 o'clock in the evening he fainted. He was seen by the writer immediately, as he happened to be on the same train. He was brought to his home and put to bed, where he had a slight chill. At that time the pain was most intense over the belly of the sterno-mastoid muscle and two or three small glands which were very sensitive could be palpated in this locality. His temperature was about 100°. At this time he was unable to swallow, apparently on account of the excessive pain. An eighth of a grain of morphin was given hypodermically but he did not sleep at all.

"The next day all his symptoms were about the same except that the pain was more intense, swallowing being impossible. Any attempt to do so resulted in the fluid coming out of his nose. A laryngeal examination showed a very much thickened and inflamed epiglottis. The swelling and inflammatory condition extended more or less around the whole rim of the glottis but was most marked on the right side. Under treatment the swelling subsided and on the

\*Read at the meeting of the New York Academy of Medicine, Section on Laryngology and Otology, March 27, 1912.



afternoon of February 1 he could swallow liquids with considerable difficulty. He improved during the night and the following morning was much better. On the evening of February 3 his temperature was normal and it was believed that he was practically recovered. About 9 p. m. that same evening, pain, very severe in character, developed in the median line directly over the larynx. The pain increased in intensity all night, and about 5 a. m. the writer was called to see him. All his symptoms had returned. There was still pain over the sterno-mastoid but the point of greatest intensity was in the median line over the larynx. He was again unable to swallow. These symptoms persisted for three days."

On this date, February 7, I saw Mr. C. for the first time. I found the patient suffering intensely. There was a very slight swelling of the right side of the neck and the whole region was exquisitely tender. The patient had been unable to swallow anything for the past seventy-two hours and had not slept at all during that time, for when he dozed, he swallowed involuntarily and the pain woke him instantly. Attempts at swallowing resulted in the fluid being expelled through the nose. There was no demonstrable paralysis of the palate. The tonsils were normal in appearance. Laryngeal examination revealed a moderate degree of edema of the epiglottis, right false cord, and over the right arytenoid. The left cord was white. The voice was clear. There was no dyspnea. Digital examination of the region of the larynx revealed nothing. The larynx was cocaineized followed by immediate relief and the patient was able to swallow two glasses of egg and milk. A diagnosis of acute arthritis of the crico-arytenoid joint was made and large doses of salicylates and a twenty-five per cent spray of ichthyol was recommended. Gradual improvement took place and he seemed to be recovering, being able to swallow with decreasing difficulty and even reached a stage where semi-solid food could be taken.

The treatment outlined above was continued, but four days later there was another relapse. I quote again from Major Wadhams' notes. "On February 11 the pain returned, this time on the right side of the larynx radiating upward toward the tip of the mastoid. The patient was unable to swallow. The larynx showed marked thickening and edema on the right side, the epiglottis was inflamed and there was marked swelling with partial obliteration of the sulcus between the larynx and the base of the tongue."

On February 17, six days later, I again saw the patient. His condition was about as has just been described, though the swelling had subsided somewhat. The pain was unimproved and the patient



had been practically without nourishment, water and sleep for six days. The temperature had ranged between normal and  $101^{\circ}$ . There had been no chills nor sweats. The culture from the primary tonsillitis showed pure streptococci. Examination of the larynx showed a very marked edema of the epiglottis which obscured a view of the deeper structures. Cocain was applied and multiple punctures were made in the edematous mucous membrane. This procedure afforded enough relief for the patient to swallow about one and a half glasses of egg and milk. Further efforts at swallowing caused the liquid to be expelled through the nose. The general condition of the patient at this time was such that it was considered wise to transfer him to a hospital and arrangements were made to remove him to the Manhattan Eye, Ear and Throat Hospital on the morning of February 19. He became progressively worse, and dyspnea which had hitherto been absent, set in and it became a question whether it would be possible to move him. His condition improved so much after the application of a leech over the crico-arytenoid joint, on the morning of February 19, that the trip by boat to the city was undertaken, Major Wadhams accompanying him with a tracheotomy-set at hand. The improvement following the application of the leech was almost magical and the patient was in much better condition when he reached the hospital than when he started on his journey, the dyspnea having entirely disappeared. No nourishment had been taken since I had seen him, forty-eight hours previously. The right side of the neck was much more swollen and induration was present. It was still exquisitely sensitive to pressure. No fluctuation could be detected. After cocainization two egg-noggs were taken. At this time a differential blood-count showed leucocytes 10040; large mononuclear 10 per cent; small mononuclear 11.5 per cent; polynuclear 78 per cent; eosinophiles .5 per cent. The treatment ordered was saline enemas, opium suppository at night and cocainization of the larynx before taking nourishment.

February 20: The general condition was much improved. Slept for three hours during the night. Is able to swallow without cocainization. Edema of the epiglottis less marked. February 21: Very much better. Edema practically gone from epiglottis. Larynx shows a moderate amount of edema over right arytenoid and posterior to it. Tenderness and swelling diminishing. Dysphagia very slight.

From this date until his discharge, one week later (February 28), his convalescence was uninterrupted. The temperature during the

whole course of the disease ranged between normal and  $100^{\circ}$  usually, reaching  $101^{\circ}$  once.

For the sake of brevity I have omitted mention of the ordinary methods of treatment that would be used to combat the symptoms enumerated, all of which Major Wadhams had used before I saw the patient.

Since this report was written Major Wadhams has written me that the patient has had a mild attack of acute articular rheumatism.

*Case 2.* (Dr. Coffin's case): M. O., female, age 29. Had had acute follicular tonsillitis, but all symptoms had disappeared and she had returned to work as a maid. Two days later severe pain and very marked tenderness developed over the right side of the neck, especially localized over the anterior border of the thyroid cartilage. Total inability to swallow. Temperature  $102.6^{\circ}$ .

A diagnosis of acute adenitis of the chain along the anterior border of the sterno-mastoid was made. The supra-tonsillar fossa was freely opened but no pus was found. The patient was referred to the hospital.

I saw the patient forty-eight hours later (March 1) with Dr. Coffin. The right side of the neck was moderately swollen and exquisitely tender. Inability to swallow was absolute. The larynx was not examined. Dr. Coffin felt that pus was present in the deeper structures and inclined to an external operation as the wisest procedure. Remembering the brilliant result following local depletion by a leech I suggested its use. Again relief was instantaneous and lasting. An uninterrupted convalescence followed and the patient was discharged three days later. The range of temperature during her stay in the hospital was between normal and  $101^{\circ}$ .

*Case 3.* (History by Major Wadhams): Dr. W. H. W., aged 32 years, general health good, previous history not pertinent. Recently returned from two years' service in the Philippine Islands. On February 11, 1912, first noticed a slight sore throat, and toward the evening of that day felt chilly and had rise of temperature to  $102^{\circ}$ . On the following day examination of the throat showed red and injected tonsils with the characteristic patches of a follicular tonsillitis. The throat was disinfected and the usual treatment instituted. The temperature remained about the same for the next two days. At the end of this time pain, neuralgic in character and of great severity, developed, involving the whole right side of the face and head with very marked sensitiveness to touch of the skin and of the scalp to the median line on that side. The right middle-

ear became painful about this time. Examination showed a mild acute tubo-tympanitis, which was relieved by appropriate treatment. The tonsillitis subsided but temperature continued and on the fourth day the pain localized itself over the belly of the sterno-mastoid muscle. A few small glands could be palpated in this region. Pain over the belly of the sterno-mastoid was constant and severe. Brawny induration developed, with tilting of the head to the right and inability to move it from side to side. Swallowing became progressively more difficult until only small quantities of fluid could be taken. There was no paralysis of the soft palate but attempts to swallow resulted in the fluid coming back through the nose. Examination of the larynx showed considerable swelling and injection of the right arytenoid fold. The cords were apparently normal. The leukocyte count varied from 15,000-18,000. On February 23, digital examination of the throat revealed bulging high up on the posterior pharyngeal wall to the right of the median line. On February 25, there was unmistakable fluctuation in this region. Externally the swelling and induration had increased, but no fluctuation could be made out. On this date under local anesthesia a vertical incision was made in the posterior pharyngeal wall about one-half inch to the right of the median line and about an ounce of pus was evacuated and the cavity flushed out. A smear made from the pus showed a mixed strepto- and staphylococcic infection. Convalescence has been satisfactory but there is still some tilting of the head to the right, and voice has acquired a pronounced nasal tone, which was not present before he became sick. The ability to swallow returned very slowly, and even at the present time, March 23, solid food has to be carefully masticated, and fluids taken slowly.

35 Park Avenue.

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**Simple Method of Applying Bismuth into Open Bone-cavities Before Taking the Radiogram.** SCHMUCKERT. *Ztschr. f. Laryngol., Rhinol. u. ihre Grenzgeb.*, Bd. 5, Heft 2, p. 263, 1912.

A salve, consisting of equal parts of bismuthum carbonicum and vaselinum album, is applied to a long strip of gauze and the latter introduced into the cavity by means of a probe. Two instructive radiograms are added.

GLOGAU.

## ANESTHESIA FOR PERORAL ENDOSCOPY.\*

BY CHEVALIER JACKSON, M. D., PITTSBURG.

While it is impossible to lay down any hard and fast rules for anesthesia in tube work, yet I believe the time has arrived when we may formulate a few general principles from which deviation can be made to suit the particular case or the operator's personal equation. The herein given rules are respectfully submitted for discussion without any claim to either originality or finality.

Total abolition of the cough-reflex should only be for short periods. The facile operator will do good work in many cases in spite of a moderate degree of cough. After a short period of tubal contact in bronchoscopy, coughing lessens and often practically ceases, especially in infants. Following the general rule in surgery, an anesthetic should never be used at all unless necessary; never in greater quantity than the needed minimum. In general surgery, anesthesia is required for three purposes. (1) The obtunding of pain, (really analgesia); (2) the abolition of reflexes, (relaxation); (3) and for psychic effect, (mainly abolition of apprehension).

For peroral endoscopy, analgesia is not required, for the pain in careful work is exceeding slight; but anesthesia for the lessening of the reflexes, and for the lessening of the apprehension which intensifies the reflexes, is necessary under certain circumstances. These reflexes are manifested by spasmodic action of certain muscular systems, chiefly those of vomituration and coughing. In so far as these may be excited by mucosal contact, they may be controlled by local anesthesia alone; for, of course, local anesthesia is purely and simply mucosal anesthesia. Muscular contractions, as well as pain, resulting from psychic mechanism, or traction upon tissues remote from the mucosa can only be controlled by deep, general anesthesia, and to a less degree, by the control of the patient's mental state through the personality of the operator. The degree of this control varies widely with the personal equation of the operator as well as of the patient. The operator who can keep his patient free from apprehension and who can keep his patient's mind fixed on the task of breathing

\*Read before the meeting of the American Laryngological Association, Atlantic City, May 9, 1912.

slowly, deeply and regularly will get along without any anesthetic and do better work than another operator under profound general anesthesia. As Bruenings has pointed out, the operator who is not sufficiently practiced to pass the tubes without general anesthesia is not justified in using general anesthesia to overcome faults in technic.

#### ESOPHAGOSCOPY.

1. For foreign bodies, no anesthetic is needed in either adults or children, except in case of very large and sharp foreign bodies, wherein the relaxation of the esophageal musculature, by deep general anesthesia, will obviate the trauma incident to the withdrawal of the intruder through a spasmodically constricted lumen.

2. In case of a sharp foreign body threatening perforation, especially open safety-pins and fish-hooks, it is safer to abolish antiperistalsis by deep, general anesthesia.

3. In cases of suspected esophagismus and cardiospasm, the spasmodic element can be entirely eliminated by deep, general anesthesia.

4. In case of large foreign bodies, general anesthesia adds enormously to the danger of respiratory arrest from pressure of the foreign body on the trachea and on the peripheral respiratory nervous mechanism.

5. The use of a general anesthetic will greatly lessen the need for skill in the introduction of the esophagoscope; but such use is utterly unjustifiable.

6. Local anesthesia is needless for esophagoscopy. If used at all, it should be applied only to the laryngo-pharynx. The esophagus is not sensitive, as anyone can determine for himself by swallowing tea uncomfortably hot. No sensation is felt after the cricoid is passed.

#### PHARYNGO-LARYNGOSCOPY.

For pharyngo-laryngoscopy or naso-pharyngoscopy with the Hays or Beck pharyngoscope or similar instrument, no anesthesia is required except in relatively rare instances when the local application of a four per cent cocain solution to the fauces is sufficient.

#### DIRECT LARYNGOSCOPY.

1. For diagnosis. In infants and children, no anesthetic whatever. In adults who tolerate indirect laryngoscopy well, no anesthetic, general or local, is needed.

2. Foreign bodies. In infants and children, no anesthesia, general or local.

3. For the removal of foreign bodies from the larynx, both local and general anesthesia should be avoided, lest their application lead to dislodgment of the intruder.

4. For papillomata in children, no anesthetic, general or local, is needed. In adults, local anesthesia is usually necessary for accurate work, in removing specimens or entire neoplasms of any kind.

5. In a few adults with intolerant and uncontrollable general excitability, and in some cases of hysteria, a general anesthetic may be necessary for accurate work in the removal of laryngeal neoplasms; but such cases are exceedingly rare.

6. For certain laryngeal growths such as small angiomas and edematous tumors that shrink so much under cocaine as to render accurate removal difficult, general anesthesia may be necessary.

#### TRACHEO-BRONCHOSCOPY.

1. For diagnosis, in children, no anesthesia, general or local; in adults, local anesthesia of the larynx in some cases; none at all in others. Rarely, local anesthesia of the trachea and bronchi as well as the larynx will be needed.

2. For foreign bodies in the trachea and bronchi of infants and small children, no anesthetic, general or local is needed, except possibly in very complicated removals, such as in case of open safety-pins. Foreign bodies in the trachea and bronchi of adults can often be removed without any anesthesia, general or local; but in many cases local anesthesia is needed. General anesthesia is only needed in complicated cases where there is a stricture to dilate to reach the foreign body, or where the mechanical problem of removal is complex.

3. For the after-treatment of strictures, local anesthesia is sufficient, and in some cases none is needed, because tolerance to manipulation becomes established after repeated passage of the instruments.

#### LOWER BRONCHOSCOPY.

Tracheotomy. If lower bronchoscopy is ever justifiable, it is only so in cases with extremely severe dyspnea, and even in such cases the facile operator will slip in a bronchoscope, through which with the aid of amyl nitrate and oxygen, artificial respiratory aid can be supplied with greater facility than through a tracheotomy wound. The occasional bronchoscopist will prefer tracheotomy, which never need be done under general anesthesia; and in a dyspneic case, general anesthesia is utterly unjustifiable because



as soon as anesthesia begins, respiration ceases, owing to the loss of the aid of the accessory respiratory musculature. The personal preference of the author, as between upper and lower bronchoscopy for any and all purposes, is in absolutely all cases for upper bronchoscopy, even if a tracheotomy shall have been already done.

#### GENERAL RULES FOR LOCAL ANESTHESIA.

If a tracheotomy is needed for any purpose it should be done under local infiltration anesthesia.

Anesthetic adjuncts such as adrenalin, antipyrin and various synthetic compounds, the author has never used; consequently, he cannot formulate any rules, even in a suggestive way, and he is compelled to rely upon Dr. Ingals and other eminent co-workers to supply the deficiency. Dr. Ingals' use of atropin as a hypodermatic preliminary seems especially commendable. Doubtless, adrenalin by the ischemia which it induces, increases anesthesia and also prolongs it by slowing the carrying away of the cocain by the blood. Bromids in large doses, some hours beforehand, as suggested to the author by Dr. Frank D. Sanger of Baltimore, have a marked effect in lessening cough-reflex, and lessening the amount of cocain needed. Morphin has also this effect, but its use is objectionable because of after-nausea, and in cases where repeated sittings are necessary, there is risk of drug habit. Heroin is an adjunct useful in some cases. None of these antiechics should be used in such large doses as to abolish the cough-reflex for a long time because as the author has frequently pointed out, the cough-reflex is the watch dog of the lungs, quickly ridding the lungs of irritative and infective materials.

For esophagoscopy, local anesthesia is needless. If used at all, its application should be limited to the epiglottis and the laryngopharynx, (not hypo-pharynx). The following rules apply to the use of cocain in the air-passages:

- (1) Cocain should never be used in infants or small children.
- (2) Its use should be avoided, if possible, in all cases, such as cases of papillomata, in which frequent sittings are necessary.
- (3) The patient should never know the name of the drug.
- (4) The amount used should be the minimum as to (a) strength of solution, (b) quantity of solution, (c) mucosal area touched.

Hence only certain highly sensitive areas should be touched with the stronger solutions; the less sensitive areas receiving only the weaker solutions, either by direct application or by the incidental flow over the moist mucosal surface following the applica-



tion of the stronger solutions to the highly sensitive areas. (5) Solutions may be applied by (a) spray, (b) syringe, (c) painting syringe (Bruenings), (d) applicator carrying cotton or gauze saturated, but not dripping, with solution.

Preference should be given to either or both of the last two methods as being more precise. The spray is useful, if the operator desires to use any anesthetic at all in case of foreign-body in the larynx, as a spray is much less liable to displace the intruder than a swab; but for this very reason, any form of anesthesia had better be omitted in cases of laryngeally lodged foreign bodies.

(6) The stomach should always be empty, not only because the tendency to vomituration and vomiting are thus lessened, but because, as proved by Bruenings, absorption of cocain is thus lessened.

#### THE AUTHOR'S TECHNIC.

The author has two porcelain jars thick and heavy, though small, (about 2 ccm.) carried with the instrumentarium. In one, an eight per cent cocain solution is freshly prepared, and in the other a twenty per cent solution. The latter is known by a red band around the jar, burned into the porcelain. This solution is used only with extreme caution and in small quantity. In no case are the jars refilled; hence the total quantity is always limited, and, of course, most of it is thrown away in the swabs and escapes with the secretions, so that only a very small portion of the solutions is absorbed by the patient. Used in this way, the author has never had a serious symptom. This method was adopted after the death of a child in rythmic symmetrical convulsions one hour after the removal of a papilloma of the larynx under cocain anesthesia. He has never, however, used cocain in children since and never will. All of his endoscopy on children under about seven years of age is done without any anesthetic, general or local, except in a very few cases of complicated foreign body extraction such as the closure of safety-pins. The author's method of application for local anesthesia is as follows: With a dossil of cotton held in a Sajous laryngeal forceps, the laryngo-pharynx is swabbed with an eight per cent solution of cocain. After two minutes' wait, the slide speculum is introduced, and the posterior surface of the epiglottis is painted with a small gauze sponge saturated with the twenty per cent cocain solution and carried in with a Coolidge applicator. A fresh sponge is saturated and carried through the glottis and down the trachea. After a two minutes' wait, the bronchoscope is introduced and if necessary, deeper applications

made as necessary. The posterior trachea wall and the neighborhood of the bifurcation are the sources of much reflex cough; and the bronchus to be entered may need an application; but the skillful operator will often dispense with local anesthesia after the first application as the cough reflex in many instances soon ceases to be troublesome, and a certain amount of cough need not interfere with work. In case of impacted foreign bodies, it is of advantage to hold the swab in contact with the surrounding tissues for about ten or fifteen seconds.

#### TECHNIC OF GENERAL ANESTHESIA.

For esophagoscopy and gastroscopy, ether or chloroform may be started by the usual method and continued by dropping upon a folded bit of gauze several layers thickly laid over the mouth after the tube is introduced. Undoubtedly, there is a remote risk from the inflammability of ether which is too often forgotten.

For tracheo-bronchoscopy, ether or chloroform may be started in the usual way and continued by holding a gauze sponge with a hemostat in front of the tube, though this means frequent interruption of the work as well as of the anesthetic. So far as interruptions of the anesthetic are concerned, they are, in the author's opinion, factors of safety, if care be taken to avoid excessively deepening the anesthesia to prolong the interval. Or, after starting in the usual way chloroform and ether may be continued by means of the Buchanan attachment directly to the bronchoscopic tube, which is the best of all methods, care being taken to time the insufflations properly in relation to inspiration. The author prefers starting with ether, and continuing with chloroform, which is relatively quite safe after the stimulant effects of ether are established.

In conclusion, I beg to urge that every effort be made to work without any anesthesia at all. My work in this direction has convinced me that anesthesia, general or local, is relatively rarely needed for peroral endoscopy.

Westinghouse Building.

## DIRECT LARYNGOSCOPY IN THE REMOVAL OF LARYNGEAL TUMORS.

BY RICHARD H. JOHNSTON, M. D., BALTIMORE.

The successful removal of laryngeal tumors by direct laryngoscopy depends upon two factors: The position of the patient's head and the use of a tube, small in size but large enough to work conveniently, the former being the more important. Most of the illustrations in text-books which show the head far back in extension are wrong in theory and practice. In such a position the difficulties to be overcome are the tension of the neck-muscles and the pressure of the instrument against the incisor teeth both of which must be done by simply pulling on the speculum. In some patients with short, thick necks considerable force must be used to see even the posterior wall of the larynx and successful operating is out of the question. Some authorities have claimed that with the head back as pictured in the books and the instrument passed between the incisor teeth, manipulation and not force is needed to see the entire larynx. In my early work I tried this method faithfully and in a few favorable cases with long, thin necks, I succeeded in getting a fair view of the larynx. But the position was so awkward and the patients so often complained of pain I was forced to give it up. To work in every part of the larynx with comfort to the patient, the head must be in such a position that the muscles are relaxed and the incisor teeth out of the way. To obtain this the head must be almost straight and turned either to the right or the left so that the instrument can be passed between the bicuspid teeth with the patient in the sitting position. I have repeatedly demonstrated that a good view of the larynx may be obtained with the head straight or bent slightly forward. In children the same method may be used by holding the patient in a sitting position but I prefer to have the child pinned in a sheet on the table because it is more easily controlled. Having found the proper position of the head, the next factor is the choice of instrument. I have tried all the various specula with and without headlight and have reached the conclusion that with Jackson's old and separable children's tubes, one can examine and operate successfully in all larynges. When one learns to regulate the lights, one can work as long as may be necessary with practically no fear

of burning them out. The double battery as devised by Jackson is much better and safer for lighting-purposes than any controller. In using the controller on one occasion, I felt a shock each time I attempted to introduce the laryngoscope. This experience convinced me that the battery is the only safe source of light.

Tumors of the posterior parts of the larynx are considered easier of removal than those elsewhere. With the methods described above all parts of the larynx are accessible and operating in the anterior commissure is not difficult. Some authorities advise the use of a general anesthetic in operating in children's larynges. In small tumors of the vocal cords situated anteriorly this may be necessary but in routine examinations and in papillomata, especially if there is any tendency to dyspnea, a general anesthetic is superfluous and adds an element of risk which is not justifiable. Papillomata can be removed from time to time by simply holding the child and without anesthesia of any kind. In adults I believe it is always possible to examine the larynx under local anesthesia with the patient sitting. Under tumors we may include tubercular lesions which are often best treated by removal through the direct laryngoscope. The cases which I shall cite comprehend almost every location in the larynx and the ease with which they were usually removed was in marked contrast to the difficulties of the indirect method.

*Papilloma of the right vocal cord:* A patient, 26 years old, had been hoarse for years. Two attempts had been made to remove the growth by the indirect method. Under cocain anesthesia with the head slightly extended and turned a little to the right, no difficulty was experienced in passing the small separable speculum between the left bicuspid teeth. The tumor which was attached at the junction of the anterior and middle thirds of the cord was quickly removed with Pfau's cutting-forceps.

*Multiple Papillomata:* The patient, 5 years old, had been aphonic for months but had never had dyspnea. It was impossible to examine the larynx with the mirror; so the diagnosis was made by holding the boy straight on the table and introducing the instrument between the incisor teeth. A portion of the growth which filled the anterior part of the larynx was removed at the first sitting. From time to time the larynx was gradually cleaned out. At the present time the boy talks well and applications of alcohol are being made to prevent recurrence.

*Multiple Papillomata:* A boy, 18 months old, had been aphonic six months. When he cried, cyanosis was quite marked. Ex-

amination with the old speculum with the head straight on the table showed the larynx practically filled with papillomata. From time to time the growths were removed until at present the larynx is quite normal. The course of the disease was much more favorable than usual. Alcohol is applied once each month to prevent recurrence.

*Fibro-myxoma of the anterior commissure:* A man, 36 years old, with pulmonary tuberculosis had a tumor in the anterior commissure which, on phonation, inserted itself between the vocal cords, thus producing a rough, almost raucous voice. Under cocaine anesthesia Jackson's separable speculum was passed between the left bicuspid teeth. A splendid view of the growth was obtained and two bites with Pfau's forceps removed it in toto. In this patient the head was straight and bent slightly to the right.

*Tubercular growth of the posterior wall:* A woman, 26 years old, had a swelling of the posterior wall which caused hoarseness. The lungs being quiescent, I advised removal which was agreed to. With the head slightly extended and turned to the right, there was little trouble in removing the growth at the first sitting under alypin anesthesia. Applications of formalin were made until the larynx had healed completely. The voice was normal and there was no lighting up on the part of the lungs when the patient suddenly developed intestinal tuberculosis to which she succumbed.

*Foreign-body in larynx:* A little girl, 2½ years old, while eating soup swallowed a bone. She coughed, became cyanotic and then quieted down. It was found that she could speak only in a whisper. With the head straight on the table the separable speculum was passed and the bone removed with Pfau's forceps. At the urgent solicitation of the parents a general anesthetic was given against my better judgment. The loss of voice proved that the foreign body was in the larynx and the anesthetic was dangerous. The bone could have been removed as easily without it.

*Tubercular ulcer of the left ventricular band:* A patient with incipient pulmonary tuberculosis had an ulcer on the left ventricular band which caused much pain on swallowing. Under novocain anesthesia with the head slightly extended and turned to the left, the small separable speculum was passed and the ulcer curetted. Formalin was then applied through the speculum. The patient soon experienced great relief in swallowing and in consequence thereof his appetite and general condition improved.

*Tubercular swelling of the posterior wall and ulcer of the epiglottis:* Young woman had had pulmonary tuberculosis eighteen

months. In October, 1911, her voice became husky and about the same time she experienced some pain on the left side on swallowing. Examination with the mirror showed a swelling on the posterior wall and infiltration with ulceration on the left border of the epiglottis. Under novocain anesthesia with the head practically straight the small speculum was passed and both lesions removed at the same sitting. Formalin was then applied.

Other cases could be cited but I think from the above list it can be seen that operative work in any part of the larynx is comparatively simple, provided the head is in the right position. The speculum used in all these cases is small enough to pass with little or no discomfort and large enough to allow plenty of room for operating. As one becomes more expert, one finds that one can operate quite as well through a small as a large tube. It is simply a question of training the eye to the proper perspective. In adults with unusually small throats or very large teeth, it may be better to use Jackson's old speculum which is somewhat smaller in diameter. To increase its usefulness in the sitting position and to allow a stronger and better hold, I have had a handle fitted to the old speculum which is similar to the handle of the separable instrument. With these two instruments all examinations of the larynx and the upper end of the esophagus can be made in adults and children. In the latter the examination is made in a few minutes without an anesthetic; in the former more time is required because it takes alypin or novocain ten or fifteen minutes to anesthetize the parts. If a patient seems nervous I give bromid of sodium, or potassium in large doses for a day or so before the operation and always a hypodermic injection of morphin ( $\frac{1}{8}$  to  $\frac{1}{4}$  gr.) and atropin (1-150 gr.) a half hour beforehand. The work should always be done in a hospital because one never knows when some condition may arise which may require a tracheotomy. A nurse should support the patient's head by allowing it to rest gently in her hands. If a second operation is necessary, the patient generally tolerates the instrument better than the first time. With the above described methods direct laryngoscopy becomes a pleasure and makes operative work in the larynx quick and sure.

807 North Charles Street.



### THREE CASES OF FOREIGN BODY IN THE BRONCHUS. \*

BY SIDNEY YANKAUER, M. D., NEW YORK CITY.

*Case 1.* A farmer's daughter, 9 years old, while feeding the chickens took a grain of corn into her mouth and in making a sudden movement inhaled it. The accident was followed by spasmodic coughing, which gradually increased in severity. At the end of a week the cough was accompanied by an evening rise of temperature, at first to 100° F., then to 101°, and by the fourteenth day to 103.5° F. There were physical signs of severe bronchitis, most marked on the right side. The child was then brought to Mount Sinai Hospital, and in spite of the high temperature was immediately anesthetized. The bronchoscope was passed without difficulty and as soon as the tube entered the right bronchus the foreign body could be seen. It was readily grasped with the forceps and withdrawn, together with the tube. On the following day there was slight hoarseness, but the temperature, the bronchial signs and the cough were diminished. On the second day the cough and other symptoms ceased.

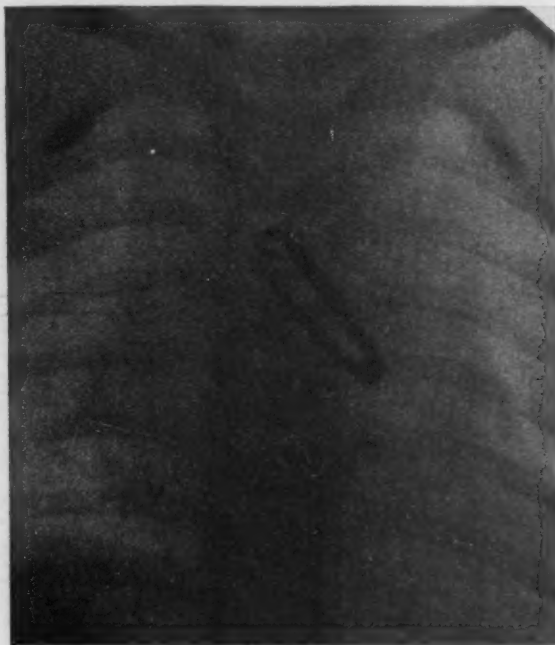
*Case 2.* On September 30 I was called in consultation with Drs. A. S. Taylor and F. W. Murray to a case with the following history: A male child, 10 months old, had inhaled an open safety-pin early in the morning of the same day. There was some cough, dyspnea, and cyanosis at the time, but this soon subsided. A radiogram taken by Dr. Cole, clearly showed the pin lying obliquely between the third and fifth ribs, with the point uppermost. The lower end of the pin was considerably to the left of the median line, so that it must have entered some distance into the left bronchus. It could also be determined that the pin lay with its back posteriorly and to the left, the point anteriorly and to the right. From the radiogram as well as from the statement of the mother, I was aware, before the operation, that on account of the construction of the pin it could not open further than indicated on the X-ray plate, a fact which aided materially in the extraction. It was decided to attempt its removal by upper bronchoscopy first, but to resort to lower bronchoscopy if necessary.

The child was taken to the New York Hospital and operated within six hours after the accident. Under ether anesthesia the

\*Read at the meeting of the New York Academy of Medicine, Section on Laryngology and Rhinology, October 25, 1911.



bronchoscope was readily introduced into the larynx and passed through the glottis, but after it had advanced about one centimeter into the trachea, further progress was prevented by a narrowing of the tracheal lumen, due to swelling of its mucous membrane. Fortunately, however, it was possible to see well beyond the end of the tube, and at about a distance of three centimeters from the end of the tube the foreign body could be distinctly recognized. Now as I knew from the X-ray plate the exact position of the foreign body as well as the extreme distance from the point to the



Case 2.

back of the pin I did not hesitate to pass the forceps with its jaws closed through the narrowed tracheal lumen until the end of the forceps lay just above the pin. The jaws were then opened wide, the instrument advanced until it covered the pin, and then the jaws were closed. It now remained to determine that the point of the pin was engaged within the grasp of the forceps. By making gentle traction I found that the foreign body was freely movable. It was withdrawn through the swollen trachea up to the end of the bronchoscopic tube, and then the two were withdrawn together.

Examination of the forceps after withdrawal showed that it had grasped the pin squarely, and that the point was well protected within the jaws of the instrument. The recovery of the patient was uneventful.

*Case 3.* A boy, 4 years old, was referred to me with the following history: At the age of 1 year he had inhaled an iron screw, following which he had a cough which has continued since. Several times a year he had attacks which the mother called pneumonia. About a year ago he was admitted to the medical service of the hospital where an X-ray picture showed the presence of the screw in the right chest near the diaphragm. A bronchoscopic examination made by the surgeons at that time was negative.

On July 28, I passed the bronchoscope under ether anesthesia. The instrument passed the larynx and entered the trachea without difficulty and was readily passed beyond the spur into the right bronchus, but was arrested at about the middle of the bronchus by a constriction in its lumen to nearly one-half the size of the bronchoscopic tube. A large quantity of muco-purulent secretion escaped from this opening, and considerable time was taken up in cleaning out the cavity beyond the constriction by means of the suction tube, swabbing, etc. It could then be seen that beyond the constriction was a large bronchiectatic cavity. The foreign body could not be seen, nor could it be felt with a probe passed into the cavity. As I had no instrument at hand for dilating the stricture, further efforts were postponed until four days later, when the bronchoscope was again passed down to the stricture and with a small cutting-forceps the stricture was partly divided by excising a small piece. A conical tube was then passed through the bronchoscope and the opening stretched; over this tube the bronchoscope could be advanced into the bronchiectatic cavity. The walls of the cavity were smooth and contained five or six openings from which pus exuded. These were probed, and in one of them a hard mass could be felt. The Lister hook was introduced into this opening and the hard body seized but it could not be brought into view. Although I was sure that this hard body was the object of the search, yet I hesitated to cut through the wall of the bronchiectatic cavity because of the danger of setting up a subsequent emphysema of the mediastinum, which has been reported to have followed such manipulations with fatal effect.

The first examination occupied one hour, the second two hours; yet in spite of the prolonged presence of the bronchoscope in the

larynx, no injury of this organ resulted, a fact worthy of note on account of the age of the child. Before a third attempt at extraction could be made the child was removed from the hospital against advice.

It seems evident that in this case that the foreign body is surrounded by cicatricial tissue in or near the wall of a bronchiectatic cavity. In a similar case reported by Prof. Killian, the bronchoscope was passed on twelve successive occasions before extraction could be accomplished.

A point of special interest is the fact that the cough and expectoration have entirely ceased since these operations, which I believe may be attributed to the divulsion of the stricture of the bronchus. This fact gives us a hint as to what might be accomplished in bronchiectasia from other causes.

616 Madison Avenue.

**Sinus Thrombosis as a Complication of Mastoiditis.** JOHN H. FOSTER, *Jour. of Ophthal. and Oto-Laryngol.*, July, 1912.

After a general consideration of the subject, a case is reported of a child 11 years old, with an acute otitis media and mastoiditis. Ten days following the onset he was operated upon. The cells over the sinus knee as well as the mastoid tip were involved and removed. Noteworthy is the location of the perforation which was in the antero-inferior quadrant. Eleven days following the mastoid operation it was found necessary to operate for sinus symptoms. A perisinus abscess of considerable extent and the sinus itself covered with dirty-looking granulations was uncovered. The sinus on opening was thrombosed, but no mention of pus or necrosis of the clot is made, and as the circulation could not be re-established from below excision of the jugular vein was performed, although no clot was present. A slight flow of blood was established from the bulbar end of sinus. The child made a good recovery. STEIN.

## ESOPHAGOSCOPY IN THE REMOVAL OF FOREIGN BODIES FROM THE ESOPHAGUS.

BY RICHMOND MCKINNEY, M. D., MEMPHIS.

Foreign bodies in the esophagus and bronchi are not generally regarded as of common occurrence, and there is little conception of the high mortality obtaining in such cases; so it may occasion some astonishment to those not conversant with the literature of the subject, when they learn that Chevalier Jackson, the brilliant American endoscopist, says that in five years 105 fatalities from foreign bodies in the air and food passages were reported in America.\* It is needless to say that there were numerous such cases similarly fatal which were unreported and unrecognized, and which evidently would enhance the already high mortality rate in these conditions. This large number of fatal cases serves to show clearly that foreign bodies in these localities are much commoner than generally believed.

It is doubtless the habit of making all small objects grist that comes to the mill of the juvenile mouth that is responsible for the frequency of these foreign-body cases in young children, but even their elders at times are guilty of inspiring or swallowing objects which require surgical intervention for their extraction.

Prior to the discovery and development of the technic of esophagoscopy, foreign bodies firmly embedded in the esophagus were removed either by the method of blind groping with long forceps, or else by the exceedingly fatal surgical procedure of esophagotomy. The first being an inexact and also dangerous procedure, and the latter one approached with dread on account of its so frequently fatal outcome, the introduction of the method of endoscopic observation and removal of foreign bodies from the esophagus was a welcome discovery, the increasing application of which rapidly is lessening the mortality rate of foreign bodies in the esophagus, and is rendering their removal an operation that is done with a great deal less apprehension, since it is both an exact and almost uniformly successful method of removing these foreign bodies. But even the use of the esophagoscope does not entirely eliminate the element of danger from the extraction of foreign bodies from the esophagus, as is evidenced in a case which I shall presently describe, and the

\*Chevalier Jackson, Jour. A. M. A., September 25, 1909.

most careful technic and after-care is required in the management of even the simplest case.

I have used both the Jackson and Bruenings instruments, the former being favored of course in America, and the latter being the most popular in Europe. My first experience was with the Jackson tubes, but my later experience with those of Bruenings

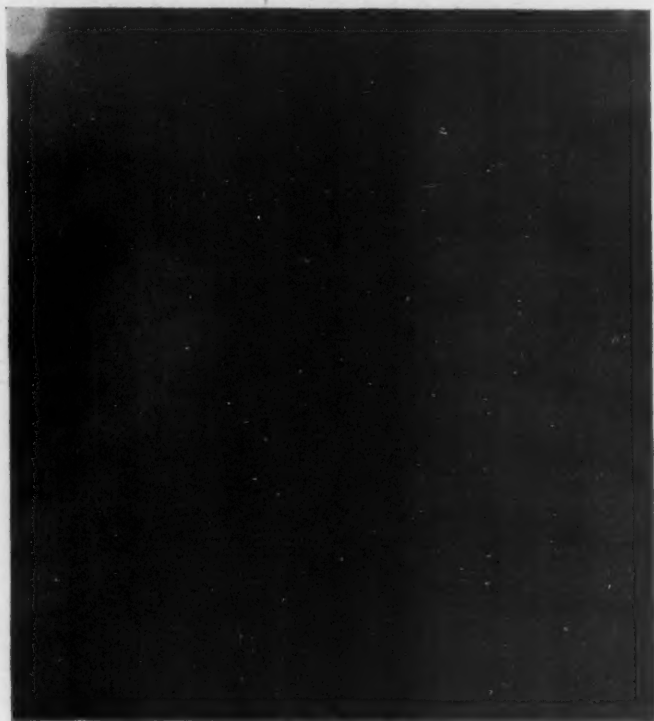


Figure 1. Hazel R., aged 15 months. Five-cent piece in esophagus, successfully removed, February 27, 1911.

has rather inclined me to their use. The Jackson esophagoscope, with mandrin, by the "blind" method, is rather easier of introduction in children, under ether, but I believe that esophagoscopy is more safely done when the tube is introduced without the mandrin, and under direct observation, not only in order to prevent lesions of the esophageal mucosa, but also in order to avoid shoving the foreign body further down the esophagus by the instrument as it is

introduced. Then, too, there is a great deal of secretion found in the esophagus, and with the Jackson tube it becomes necessary to frequently swab or pump this mucus out, in order that the small lamp in the end of the tube may not be occluded. Besides this, it is always very difficult to avoid some slight traumatism to the

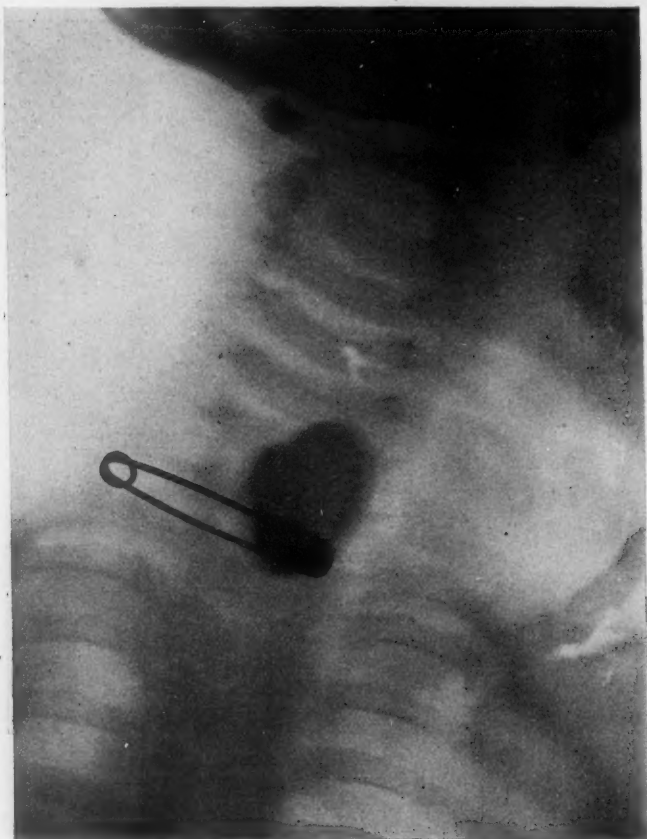


Figure 2. Safety-pin is incidental, being in the child's gown.

mucous membrane of the esophagus, and it matters not how slight this may be, blood will exude and cover the lamp. With Bruenings' tubes, since the light is reflected from above, this handicap does not arise.

The use of the X-ray as an adjunct to esophagoscopy is too well accepted in practice to require comment, for wherever it is available, the securing of a good radiogram should be the first step to take in locating a foreign body.

It is remarkable what large objects may be introduced into the infantile esophagus. The esophagus of a child 2 years of age is not wider than ten millimeters, yet at times objects of considerably greater diameter are found in the esophagus of children of this age and younger. This, very likely, is due to the distensibility of the walls of the esophagus.

In my experience I have observed several cases where a great deal of harm was done by the attending physician in his well-meant endeavors to remove the foreign body with forceps, and I know that in some cases the foreign body was wedged deeper and much more firmly into the esophagus through these attempts. Sometimes the physician, called in a hurry, seeks to shove the foreign body down the esophagus to the stomach, trusting to nature's ability to take care of it after it has reached that organ. This is a very dangerous practice, for there is great likelihood of the esophagus being ruptured through such efforts, which would mean speedy death to the patient, and there is little chance of shoving a foreign body that already is wedged in the esophagus down a tube so long, and past the hiatus esophagi, where there is a sphincter-like action contracting it. Usually a foreign body that can be shoved easily down the esophagus will pass down involuntarily in the course of a little while, and does not require assistance from without. A foreign body firmly wedged in the esophagus should be a *noli mi tangeri* for unskilled attempts at its removal.

The question of the kind of anesthesia to be used in these cases immediately presents itself. The mucosa of the esophagus is practically devoid of sensation, for we know that even a large food bolus may be swallowed without further discomfort than that of fullness, but children will not submit to esophagoscopy without the use of a general anesthetic unless they be firmly held, and even then their struggles may be so violent as to interfere with the introduction of the tube, or may cause the operator to produce a laceration of the esophagus. And what is perhaps of even more importance, the contractile power of the walls of the esophagus can be satisfactorily done away with only where general anesthesia is used. In children, I think a general anesthetic is always indicated, either ether or chloroform, the former being given preference by me owing



to the greatly lessened danger accompanying its administration, even though it does excite a very annoying flow of mucus. In adults, cocain may be used, but we occasionally find adults who are so apprehensive and nervous that ether anesthesia is advisable.

It is not my intention to present a series of reports of cases of foreign body in the esophagus, but merely to describe one of the earliest of my cases, which was also the youngest case that I have ever operated upon, and to give the details of a recent and fatal case. None of us enjoys reporting fatalities in his practice, but it is from these reports that we learn the most, and in this case I have the satisfaction of realizing that my own part of the work was well done, and subsequent disregard of my instructions was responsible for the fatal outcome.

*Case 1.* Hazel R., of Wynne, Arkansas, aged 15 months, was referred to me by Dr. E. C. Ellett, of Memphis, on February 27, 1911. Six days prior to this, February 21, the child had swallowed a five-cent piece. The father of the child said that this could be seen at first, but owing to interference with breathing, and inability to remove it, it was shoved down into the esophagus. The child was having some little difficulty in swallowing, taking fluids only, and seemed to suffer considerable pain.

Examination with the fluroscope revealed the nickel in the esophagus, just above the suprasternal notch. A radiogram made by Dr. Lawrence, at that time, confirmed this. (Figure 1).

At 5 o'clock that afternoon, at the Lucy Brinkley Hospital, with the child under ether, a Jackson esophagoscope was introduced, and the coin at once detected at the location indicated by the radiogram. It was standing perpendicularly, and with Jackson's forceps was grasped and removed. The child returned home the next day, no complications having ensued.

For children under 2 years of age we ordinarily use a seven millimeter esophagoscope, and the Jackson tube of this diameter measures over all about ten millimeters and this can be introduced into the esophagus of a child of this age or under without encountering much resistance, but a five-cent piece measures 21 millimeters in diameter, and from this it can be appreciated how firmly wedged into the esophagus the nickel was in the above case. Indeed, it required the exercise of considerable strength to dislodge it.

*Case 2.* Hattie R., of Williamsville, Mississippi, aged 2 years, was referred to me by Dr. J. A. Vaughan, of Memphis, on January 1, 1912. The child had swallowed an overall-button three or four

days prior to having been brought to Memphis. She could swallow fluids only, and these with great difficulty. A radiogram made by Dr. Lawrence showed the button very clearly, standing upright in the esophagus, just about the suprasternal notch. (Figure 2).

Under chloroform anesthesia, at the City Hospital, a Bruenings esophagoscope was introduced, and the button found in the esophagus at the point indicated by the picture. There was considerable congestion and swelling of the esophageal mucosa. Using a strong Jackson alligator forceps, repeated attempts to secure the button were made, but the button was so firmly seated that the forceps would slip when the necessary amount of strong traction was made, at times so strong as to bend the forceps. Finally, however, after bathing the swollen tissues in adrenalin solution, I succeeded in dislodging the button and pulling it up to the pharynx, where Dr. Vaughan caught it with dressing forceps and removed it. Owing to the already greatly congested condition of the esophagus, and the danger of edema of the laryngeal tissues due to the unavoidable traumatism accompanying the pulling of the button through the introitus, I was very apprehensive of edema of the glottis and suffocation in this case, and instructed that an ice-bag be kept on the child's neck, and that she be watched closely for symptoms of respiratory obstruction, and on the first appearance of these symptoms, either Dr. Vaughan or I be called, in order that a tracheotomy might be made. We heard no further from this case until the next morning at 8 o'clock, when Dr. Vaughan 'phoned the hospital to ascertain how the patient was doing, and was then informed that she had died at 6:30 that morning from asphyxiation, obstruction to respiration having begun at 2:30 a. m.

In this case a simple tracheotomy, affording the little patient an opportunity to breathe for a few hours until the laryngeal inflammation had subsided, doubtless would have saved her life; so it can be imagined how keen was the regret of both Dr. Vaughan and myself over the failure to notify us of the beginning difficulty in breathing. After having practically saved the child's life by the extraction of this large foreign body, which measured twenty-three millimeters in diameter, we felt chagrined and regretful that our efforts should have come to naught through a readily avoidable consequence.

Memphis Trust Building.

## STRICTURE OF THE UPPER END OF THE ESOPHAGUS.

BY M. E. HOLMES, M. D., BOSTON.

Non-malignant stricture of the upper end of the esophagus in adults is comparatively rare, and without a history of trauma, tuberculosis or syphilis it is a very rare condition. The first reported case was by Gerard Blasius in 1674<sup>1</sup>. In 1889, Brossen<sup>2</sup> could find but seven reported cases. Kendall Franks<sup>3</sup> reported a case in 1894, and mentions nine other cases. In 1894 Zenker<sup>4</sup> reported six cases. Last year Dr. Clark<sup>5</sup> reported a case similar to my first case. Dr. Mosher<sup>6</sup> reported a case of web in the same locality but with a larger opening. Diphtheria, syphilis, tuberculosis, typhoid, scarlatina, and pneumonia have been given as etological factors in producing esophageal strictures. Trauma from foreign solid bodies and destruction of tissue by acids and alkalis may also be followed by contracting cicatricial bands.

In the two cases which I am reporting there was nothing in the history to throw any light upon the cause or progress of the lesion, unless it were an attack of diphtheria in the second case. They were probably moderate congenital strictures to begin with which were gradually increased by inflammatory processes set up by more or less trauma caused by swallowing food of too large a size to easily pass through the cicatricial areas.

Both of these cases were in females, one 38 and the other 30 years of age. The symptoms were of long standing, increasing in severity, and in both cases the life of the patient was endangered; for at the time of operation it was not only impossible to swallow solids but it was practically impossible to swallow liquids. In the first case the symptoms had been present since early childhood and in the other for fifteen years. In both cases there had been exacerbations of more serious obstruction, lasting for a few days or weeks, and followed by relief approximating the condition before the more serious attack. Each attack of increased obstruction was more serious and the interval of relaxation following was not as a rule as free as the one preceding. The strictures were both just below the level of the cricoid. The first case appeared as a diaphragm with a small opening which just admitted a small probe. There were no marked inflammatory signs about the stricture. In the other case the mucous membrane was more injected and not

as smooth as in the first. The area above was in appearance more funnel-shaped. It was with difficulty that a probe could be passed.

These cases although resembling each other in many symptoms were very different in appearance and in the difficulty in operation. The first was easily operated upon and the patient was well at the end of ten days and has remained so. The second case was much more difficult to relieve by operation. There was more reaction following the operation. The patient progressed favorably for three days and could swallow with little difficulty. She was in excellent condition and was preparing to leave the hospital when she suddenly died, and as we could not obtain an autopsy we were unable to state positively the cause of death.

*Case 1:* Miss E. B. was referred to me by Dr. Wm. Fay, February 16, 1910, to find if possible the cause for a progressive difficulty in swallowing. She was 38 years of age and gave a good family history. Her past history save for the dysphagia was good. As long as she could remember there had been some difficulty in swallowing meat, except in very small pieces. She could never swallow pills or even grapes. By being careful she had been able to eat fairly well until late in her teens when there was an attack lasting for a few days during which there was great difficulty in swallowing even liquids. This attack passed away but ever after there was more difficulty than before the attack. About two years elapsed after the first before the second attack. During the second attack she was examined by several physicians and a diagnosis of hysteria was made by some of them. The severe symptoms passed in ten days or two weeks. There were no nervous symptoms following, and no other signs of hysteria, and during the following attacks of more marked stenosis there were no neuritic symptoms. There was however a progressive dysphagia.

The exacerbations became more frequent and when she came to me she had been unable to eat solids for many months. There was quite marked emaciation and the general appearance was poor. The lungs and heart were negative. The urine showed a slight trace of albumen but was otherwise normal. The nose, epipharynx, pharynx and larynx were practically normal.

When the esophageal tube was introduced there was found at just below the cricoid a diaphragm across the esophagus. There was an opening at the left of the center which would admit a small probe. There was no spasm and though it seemed to be a comparatively thin structure I was unable with moderate force to dilate the opening with a sound.

The condition seemed favorable for operation and on February 25 the patient was admitted to the Perry Hospital and under ether I was able by means of a director and guarded knife to incise and dissect the diaphragm to near the normal esophageal wall. Before the operation the nose and epi-pharynx were carefully cleansed with 50 per cent alcohol. Following the operation only sterile water was allowed for forty-eight hours. Nutrient enemas were given for three days.

There was no temperature or apparent shock following the operation and at the end of a week the patient was able to swallow meat for the first time in her life. She began to improve in every way and has remained well since.

*Case 2:* Mrs. S. N., 30 years of age, was referred to me by Drs. Tolman and Jones and I first examined her May 4, 1911. She was at this time suffering from a severe attack of dysphagia which had lasted about two weeks. She gave a history of a number of similar but less severe attacks. The first attack came rather suddenly when she was 15 years of age. Up to this age she had been well. In early childhood she had suffered a severe attack of diphtheria but apparently thoroughly recovered. Following the first attack of dysphagia there had been a number of others, but they had come with no regularity. She had suffered badly during these attacks being unable to swallow solid food and at times it was with difficulty that she swallowed liquids. During the interval between the attacks she was able to eat solid food if it was in small pieces, and she could drink without much difficulty until the last two or three attacks.

Mrs. N. was well-nourished and healthy looking. The heart, lungs and kidneys were normal. The pupils reacted normally. The nose was normal. There was some adenoid tissue in the epi-pharynx. The larynx was normal. About three-quarters of an inch below the cricoid cartilage there was a stricture which would not admit the smallest bougie. We tried to use the esophagoscope with cocain but were unable to do so as the patient was extremely nervous. Five days later she returned and wished to be admitted to the hospital, and on May 9 she was admitted to the Boston City Hospital. Under ether by the aid of the esophagoscope I found a stricture just below the cricoid. Instead of appearing like a diaphragm this looked more like the opening of a string-gathered purse. We were able by dissecting to pass a small sound and after this I cut on either side with scissors until a No. 3 sound was easily passed.

The same aseptic precautions were taken before and after the operation as in the first case but there was considerable reaction. There was moderate swelling of the neck and the patient was uncomfortable for the first two days. On the third day she was able to swallow without much trouble. She progressed very favorably and on the fourth day she was to return to her home. I saw her at about noon and found her in excellent condition. Dr. Tolman saw the patient at 1 p. m. and found her apparently well, except for a pain in the left side of the abdomen. He ordered one-eighth of morphin sub-cutaneously. At about 2:50 p. m. while she was talking with her husband she suddenly became unconscious and in a moment she was dead. She did not struggle for breath nor had there at any time been labored breathing. We could not get an autopsy and can therefore only surmise that perhaps an embolus had entered a coronary artery.

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531 Beacon Street.

**Systemic Infection Through the Pharyngeal Lymphoid Ring Calling for Surgical Intervention.** C. B. WYLIE, *Jour. of Ophthalm and Oto-Laryngol.*, Aug., 1912.

The first and most important of the chronic diseases with which the tonsillar tissues are associated, and in many cases the primary foci of infection, is that of tuberculosis. The second constitutional disease of importance, which is associated with and follows lymphatic inflammation of the throat, is rheumatism.

In a similar way acute and chronic nephritis, endocarditis and arterio-sclerosis have been recognized.

STEIN.

## A "SPLIT" MASK FOR THE ADMINISTRATION OF ANESTHETICS DURING OPERATIONS WITHIN THE MOUTH.\*

BY SAMUEL IGLAUER, M. D., CINCINNATI.

The "split" mask shown in the accompanying illustration is designed for the purpose of continuing the administration of an anesthetic, while an operation is being performed within the oral cavity. In all respects it resembles an ordinary chloroform inhaler, except



R-R' Wire frame of mask.  
B-B' Cross-bar which may be separated.  
P-P' Pivots.

that two crossbars (BB') are pivoted in the rim at (PP') in such a manner that the mask may be thrown open in its transverse diameter, as shown in the illustration.

The mask is used in the following manner. Sterile gauze, in two sections, is stretched over the transverse bars (BB'), and is held in position by the wire rim (RR'). The anesthetic is first dropped upon the closed mask until anesthesia is complete. The two sections of the inhaler are then separated (see cut) leaving an opening corresponding to the mouth, which is held open by a mouth-



gag. The surgeon then proceeds to operate *through* the mask, while the anesthetist continues to drop the anesthetic upon the two sections of the "split" mask. The anesthetic vapor being heavier than air tends to gravitate into the mouth, and anesthesia may be prolonged for a considerable period without interrupting the operation.

The mask interferes but very slightly with the necessary manipulation of the operator, and the inhaler does away with the necessity of complicated pumps, vaporizers, etc.

22 West Seventh Street.

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**Fronto-ethmoidal Trepanation.** A. IWANOFF. *Ztschr. f. Laryngo-Rhinol. u. ihre Grenzgeb.*, Bd. 5, Heft 2, 1912, p. 265.

As in most instances both frontal and ethmoidal cavities are involved and have to be operated upon simultaneously, the writer suggests the name of fronto-ethmoidal trepanation instead of radical operation for the respective methods of Taptas, Jacques and Killian.

Before doing the Killian operation under general anesthesia, he injects a one per cent cocain-adrenalin solution to prevent bleeding. He starts at the orbital wall of the frontal sinus and removes the anterior wall only when the cavity is large. Like Hajek, he does not pay attention to the trochlea and to the nasal mucous lining, when removing the frontal process of the upper jaw.

The writer reports twenty-three cases of fronto-ethmoidal trepanation, wherefrom eighteen were cured and five improved. He criticises Hajek's indications for the radical operation as being too conservative. He advocates radical procedure even in uncomplicated cases of chronic suppurative frontal sinusitis, when the naso-frontal duct is not perfectly patent, when the character of the pus does not change after intra-nasal operations and when polypi recur in the middle meatus.

Post-operative cerebral complications are, in the writer's opinion, due to unskillful technic. He quotes, however, an unusual post-operative complication that occurred after a thorough fronto-ethmoid trepanation,—pyemia with pulmonary symptoms and metastasis in the joints.

GLOGAU.

## SOCIETY PROCEEDINGS. NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

*Regular meeting, April 24, 1912.*

JOHN F. MCCOY, CHAIRMAN.

*Continued from page 1156.*

DR. E. A. BOGUE: Orthodontia may be divided into three headings.

1. The ordinary slow orthodontia which is the kind that is done by all dentists and all practitioners of the Angle school, and probably by any others whose only thought is to re-adjust mal-posed teeth into proper alignment. This sort of orthodontia has greatly confused the rhinologist as he has frequently found that it did not have the desired influence on the nasal passages or septum, or if it did—that the time employed was so great that the main object of the rhinologist became swallowed up in that of the orthodontist, whose eye and attention were fixed upon his special part of the work.

2. The second heading would embrace rapid spreading, and is, of course, applicable only to what are known as contracted arches, strictly arches that have not expanded normally, and consists in a rapid movement of the two halves of the upper maxillary bones, operating through the instrumentality of the teeth. This almost always and very promptly relieves nasal stenosis, straightens out nasal septa almost uniformly if done early enough, and can be very promptly supplemented by orthodontia of the lower teeth, bringing them into proper occlusion with the new positions of the upper row, which also can subsequently have the little niceties of adjustment attended to after the apparatus used for rapid spreading shall have been removed.

3. The third heading comprises what we may call preventive orthodontia and will not be considered excepting by those who have learned the law of service—who care much more for the good they may accomplish, and for the welfare of the patient than they do for their own personal profit, those who desire to prevent untold misery, sickness and death, rather than profit by treating such cases after they occur. This preventive orthodontia is practiced exclusively upon the temporary teeth of young children, which by being early drawn into the positions that they ought to occupy, carry with them the crowns of the permanent teeth lying immediately beneath them, so that when the temporary teeth lose their roots and in the process of development fall out, the permanent teeth are already in the positions they should occupy, the antra are of normal size, the septa reasonably straight, the nasal passages ample.

Orthodontia of these permanent teeth will not often be needed.

V. H. JACKSON: I am glad that Dr. Haskins has presented a paper on this subject before the section, and that it is being discussed by progressive rhinologists and orthodontists. For a considerable number of years I have been impressed with the importance of harmonizing the work of these specialties, as the interest of each is intimately related, and their combined work is needed for the welfare of humanity.

I have recognized the necessity in some cases of moving the teeth bodily without causing much absorption of the alveolar process, that is, by holding the teeth firm in one position by a part of an apparatus as extensive force is being applied, and move the teeth rapidly before any extensive absorption of the process can take place; this is not impossible, as absorption of the process is rather slow, and any extensive force applied while the teeth are being supported in an upright position naturally takes more of the alveolar process with them in their movement, and stretches the bone in the weakest points, or separates the bones at the sutures. At the same time I have favored with young patients the stretching of the bone at the sutures by definite, light, steady force with a strong spring, using a tracing to indicate the change, so that a slight definite change of force at a time can be made and have each change absolutely accurate and recorded. The stretching of the bone develops the arch by adding bone especially in the region of the sutures, and the alveolar process.

I have usually advised that the nose and throat be examined before regulating the teeth, and have adenoids and enlarged tonsils removed for the reason that if the patient is enabled to breathe more freely, the muscles will help in the movement of the teeth.

The sudden expansion of the upper dental arch of the adult forcing apart the divisions of the arch at the sutures must necessarily cause some congestion.

Noting how little time I would probably have assigned to me to speak this evening, I determined that I could cover more ground and be more concise in my remarks by making quotations from some of my previous writings bearing upon the subject, than to speak in a general way.

In a paper I read before the First District Dental Society of New York in 1890 (*Dental Cosmos*, 1890, page 285) I made an effort to arouse the dental profession to the needs of recognizing the importance of treatment of nasal stenoses and the expansion of the dental arch, going over the matter of natural development of the arch and restricted or changed development caused by constitutional conditions, and faulty breathing from adenoids and enlarged tonsils, etc., and finally said so much, that not all of my paper was published.

Also, in 1887 and in the year 1900 I called attention to the importance of this work in my writings and demonstrations.

In my "Orthodontia" published in 1904, in connection with the history of a case requiring the expansion of the dental arch for increasing the nasal capacity and improving the occlusion of the teeth, I stated (page 135) that:

"If from any cause the growth of the upper maxilla has been arrested, the early expansion of the dental arch encourages the development of the

jaw and also broadens and increases the air passages of the nares. The changes brought about by the expansion of the arch later in life are depended principally upon the movement of the teeth and process.

"After the formative stage of the jaw has passed, the rapid and forcible expansion of the dental arch, as by the use of a jack-screw not infrequently separates the maxilla at the suture at the medium line. This is thought by some practitioners not to be objectionable, but I have seen several cases accompanied with a degree of congestion that certainly did not encourage the desired bony deposit in those parts. This unpleasant result has not been observed to follow the use of gradual spring-pressure."

The text then continues to speak of the use of the jack-screw for the correction of irregularities of the teeth, describing how the jack-screw is anchored by the use of collars cemented to the teeth, etc.

In August, 1909, in my paper read before the International Dental Congress at Berlin, (see transactions), I stated:

"When the dental arch is narrow, the nasal openings are narrow, and are accompanied with more or less nasal stenoses," and, in order to accomplish the expansion of the dental arches and the equalizing of the arches in a most complete manner, the appliance should support the teeth in an upright position.

"Of children, about thirty per cent suffer with nasal stenoses, requiring expansive treatment. A large per cent of these cases are caused by the lack of natural capacity, due largely to the contracted dental arch and nares. The roof of the mouth is the floor of the nose."

The proper lateral expansion of the upper dental arch especially in young patients, while in their developmental stage increases the nasal openings and improves the breathing capacity. The expansion is accomplished by grasping the crowns of some or all of the anchorage teeth and moving them bodily outward with the bone and process.

The anchorage to the teeth for this purpose is accomplished in several ways. It is made possible by the arrangement of lugs or tubes on collars cemented to the teeth to support apparatus, etc.

At Budapest, August 29, 1909, before the International Medical Congress, Section of Stomatology, I read a paper entitled—"Expansion of the dental arches to increase the nasal passages, for the purpose of improving the breathing capacity, and for correcting the occlusion of the teeth," from which I make the following quotations:

"In the year 1887 and in 1900, the writer called attention to the importance of expanding the dental arches for increasing the nasal openings to improve the breathing capacity. Changes in the shape of the palatine processes of the upper maxilla and of the inter-maxillary bone, changes the floor of the nose.

"The principal object in preparing this paper is to describe a method for expanding the dental arches in a manner that will increase the capacity of the nares to improve the breathing; apparatus for this purpose will be described."

*To be continued.*

